

<p style="text-align: right;">1</p> <p>1</p> <p>2 SUPPLEMENTAL ENVIRONMENTAL</p> <p>3 IMPACT STATEMENT</p> <p>4</p> <p>5 Suffolk Community College</p> <p>6 20 East Main Street</p> <p>7 Riverhead, New York</p> <p>8 3:00 p.m.</p> <p>9 December 8, 2014</p> <p>10</p> <p>11</p> <p>12 S P E A K E R S:</p> <p>13</p> <p>14 BERNWARD J. HAY, PH.D, LOUIS BERGER</p> <p>15 JEAN BROCHI, Project Manager, EPA, Region 1</p> <p>16 FRANK BOHLEN, University of Connecticut</p> <p>17 GRANT MCCARDELL, University of Connecticut</p> <p>18 A U D I E N C E S P E A K E R S:</p> <p>19 ADRIENNE ESPOSITO, Citizens Campaign for the</p> <p>20 Environment</p> <p>21 MARGUERITE PURNELL, Fishers Island</p> <p>22 BILL GASH, Connecticut Maritime Coalition</p> <p>23 KEVIN MCALLISTER, Defend H2O</p> <p>24</p> <p>25</p>	<p style="text-align: right;">2</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 DR. HAY: I think we are ready to</p> <p>3 start. Welcome to this public meeting. Good</p> <p>4 afternoon. Before we start, a couple of</p> <p>5 housekeeping items. The sign-up sheet is</p> <p>6 outside. I hope everyone has had a chance to</p> <p>7 sign in at this point. The public rest rooms are</p> <p>8 on the right side down the corridor, both ladies'</p> <p>9 room and men's room. Also, please turn off your</p> <p>10 cell phones or put them on vibrate.</p> <p>11 My name is Bernward Hay. I am with</p> <p>12 the Louis Berger Group. We are under contract</p> <p>13 with the University of Connecticut, which is</p> <p>14 under contract to the Connecticut Department of</p> <p>15 Transportation. We have been assisting the</p> <p>16 Connecticut Department of Transportation and the</p> <p>17 EPA to prepare a Supplemental Environmental</p> <p>18 Impact Statement for the potential designation of</p> <p>19 one or more dredged material disposal sites in</p> <p>20 open waters. The EPA is the federal lead agency</p> <p>21 for this project. In addition to this public</p> <p>22 meeting, there will be another one tomorrow,</p> <p>23 which will be held in New London, Connecticut.</p> <p>24 Today's meeting is designed to</p> <p>25 present findings of the physical oceanography</p>
<p style="text-align: right;">3</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 study that was conducted as part of the</p> <p>3 Environmental Impact Statement. This meeting</p> <p>4 will be informational, and there will be a</p> <p>5 presentation. Therefore, there is no comment</p> <p>6 period, but we do have time for questions and</p> <p>7 comments at the end of the presentation as well.</p> <p>8 Ms. Jean Brochi is the project</p> <p>9 manager of the Ocean and Coastal Protection Unit</p> <p>10 of the EPA. She will open the meeting, and will</p> <p>11 give you a project update. Then this will be</p> <p>12 followed by the physical oceanography</p> <p>13 presentation by Frank Bohlen and Grant McCardell</p> <p>14 from the University of Connecticut Marine Science</p> <p>15 Department. Again, then we will have some time</p> <p>16 for questions and for comments.</p> <p>17 The meeting is recorded by a</p> <p>18 stenographer, and also on audio devices, and the</p> <p>19 transcript will be available, after the meeting</p> <p>20 at some point, it will be made available to the</p> <p>21 public on their web site, at the EPA's web site.</p> <p>22 With this, Ms. Brochi will open the meeting.</p> <p>23 MS. BROCHI: The other speakers</p> <p>24 probably won't need a microphone, but I do. Even</p> <p>25 with the microphone, if you can't hear me, please</p>	<p style="text-align: right;">4</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 just raise your hand or ask me to repeat</p> <p>3 something.</p> <p>4 Anyway, thank you all for coming</p> <p>5 out this afternoon on this wonderful winter day.</p> <p>6 If you haven't been to a meeting before, this is</p> <p>7 an EPA meeting, and it is a combined EPA Region 1</p> <p>8 and Region 2. We have several EPA</p> <p>9 representatives here. I am Jeanie Brochi, as</p> <p>10 Bernward said. Mel Cote, my manager is here.</p> <p>11 Doug Pabst and Pat Pechko from Region 2, and</p> <p>12 Alicia Grimaldi, who you met when you first</p> <p>13 signed in, is also from our office in Region 1.</p> <p>14 This is for a Supplemental</p> <p>15 Environmental Impact Statement for Eastern Long</p> <p>16 Island Sound. The last set of public meetings</p> <p>17 that we had in this facility, actually, was in</p> <p>18 June, June 25th and 26th. Again, the primary</p> <p>19 focus of this meeting is for the physical</p> <p>20 oceanographic study, and Frank Bohlen will start</p> <p>21 that off.</p> <p>22 Again, under the Marine Protection</p> <p>23 and Research Sanctuaries Act and the Clean Water</p> <p>24 Act, EPA and the Corps of Engineers share</p> <p>25 responsibility for dredged material management.</p>

<p style="text-align: right;">5</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 Several Corps of Engineers personnel are here</p> <p>3 today. Under Section 102 of the Marine</p> <p>4 Protection and Sanctuaries Act, EPA has the</p> <p>5 authority to designate disposal sites for dredged</p> <p>6 material.</p> <p>7 The Long Island Sound Dredge</p> <p>8 Materials Disposal Site designation was</p> <p>9 officially, the final designation was in July of</p> <p>10 2005, and that was for the western and central</p> <p>11 disposal sites. The Corp has the authority to</p> <p>12 select sites on a temporary basis. So Cornfield</p> <p>13 Shoals and New London disposal sites, which are</p> <p>14 in the eastern part of the Sound, were selected</p> <p>15 by the Corps of Engineers, and expire in 2016.</p> <p>16 Here are the disposal sites. You</p> <p>17 can see the Western, Central and this meeting is</p> <p>18 focusing on the Eastern sites. Again, our role</p> <p>19 is to designate disposal sites. In doing so, we</p> <p>20 develop a site management and monitoring plan.</p> <p>21 EPA also has a shared role in reviewing dredging</p> <p>22 permits, but an applicant would apply to the Corp</p> <p>23 of Engineers for a federal permit.</p> <p>24 We initially write the</p> <p>25 Environmental Impact Statement looking at site</p>	<p style="text-align: right;">6</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 screening, and there were site screening criteria</p> <p>3 both general and specific in the Marine</p> <p>4 Protection and Sanctuaries Act, which we</p> <p>5 follow. I didn't go into detail here, but I do</p> <p>6 have the presentation that went into detail from</p> <p>7 June.</p> <p>8 Initially, we had the 11 sites in</p> <p>9 Eastern Long Island Sound. Now we are focusing</p> <p>10 on six sites, which include Cornfield, New</p> <p>11 London, Niantic, Orient Point, Clinton and Six</p> <p>12 Mile Reef. The physical oceanography study that</p> <p>13 you are going to listen to the result of and the</p> <p>14 analyses today initiated, the study initiated</p> <p>15 with some additional buoy locations, and the</p> <p>16 green shows the buoy locations, the labels show</p> <p>17 the historic sites, and the labels that are not</p> <p>18 in yellow show the dredged material disposal</p> <p>19 sites.</p> <p>20 This process kicked off with a</p> <p>21 Notice of Intent in October of 2012. We have had</p> <p>22 several cooperating agency and public meetings,</p> <p>23 as I mentioned. One of the last public meetings,</p> <p>24 Sarah Anker's office recommended that EPA and the</p> <p>25 Corp start educational webinars to talk about</p>
<p style="text-align: right;">7</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 dredging, the process of dredging and some dredge</p> <p>3 material equipment. We held one webinar so far,</p> <p>4 and it was on April 3rd, and it was well</p> <p>5 attended. So we want to thank any</p> <p>6 representatives, if you are here. Thank you.</p> <p>7 Thank her for us, because that was very well</p> <p>8 attended.</p> <p>9 If you didn't sign in, please do</p> <p>10 so. But if you did, and you want to comment</p> <p>11 after this meeting, or you have questions, feel</p> <p>12 free to send it to the ELIS at EPA.gov E-mail</p> <p>13 system. If you are not on our notification</p> <p>14 system about upcoming meetings, please feel free</p> <p>15 to sign up for that. We also have the minutes</p> <p>16 from the meetings, and we will have all the</p> <p>17 documents posted on our EPA Region 1 web site.</p> <p>18 The address is listed up there.</p> <p>19 The next step in this process is to</p> <p>20 further evaluate the sites, draft rule making,</p> <p>21 and a draft supplemental Environmental Impact</p> <p>22 Statement by spring 2015. We will hold</p> <p>23 additional public meetings at that time, and</p> <p>24 those will be official comment periods on the</p> <p>25 draft, and the draft rule making.</p>	<p style="text-align: right;">8</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 Assuming that the SEIS recommends</p> <p>3 designation on one or more sites, then we will</p> <p>4 move forward with the final SEIS and rule making.</p> <p>5 That would be no later than December 2016.</p> <p>6 With that, I am going to introduce</p> <p>7 Frank for the physo discussion.</p> <p>8 DR. BOHLEN: Good afternoon. Can</p> <p>9 you hear me? If you can't, speak up. I am Frank</p> <p>10 Bohlen. I am a physical oceanographer at the</p> <p>11 University of Connecticut Department of Marine</p> <p>12 Sciences. I have been working on sediment and</p> <p>13 sediment transport for 45 years. A fair amount</p> <p>14 of that work has been done around dredged</p> <p>15 material disposal sites, dredging and dredged</p> <p>16 material disposal sites.</p> <p>17 We have seen the evolution of</p> <p>18 information over the past 45 years, and there has</p> <p>19 been, believe it or not, a substantial evolution.</p> <p>20 I want to emphasize that we are going to be</p> <p>21 talking about the physical oceanography, physical</p> <p>22 oceanography of Long Island Sound, as in physics.</p> <p>23 Not the biological, not the chemical, geochemical</p> <p>24 nor the political. Physical oceanography.</p> <p>25 We are going to be talking about</p>

<p style="text-align: right;">9</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 the physical oceanography in the Zone of Siting</p> <p>3 Feasibility. We will try to define that. By the</p> <p>4 way, if at any time you don't understand the</p> <p>5 language, don't be afraid to speak up, because we</p> <p>6 often tend to speak our own language. It is</p> <p>7 taken for granted that everybody knows where</p> <p>8 Staten Island is, sort of thing. Then you come</p> <p>9 out after the talk, and you find out that nobody</p> <p>10 knows where Staten Island is. Holy Christmas.</p> <p>11 So that doesn't work. Don't be afraid to ask the</p> <p>12 question if you don't understand the language.</p> <p>13 Physical oceanography in the Zone</p> <p>14 of Siting Feasibility. Why? Because one of the</p> <p>15 first questions that is often asked is, is the</p> <p>16 stuff going to stay put, and under what</p> <p>17 circumstances might it not stay put, and if it</p> <p>18 doesn't stay put, where is it going to go. So it</p> <p>19 makes sense to begin with the physics. Besides</p> <p>20 the fact that it is the queen of the sciences, so</p> <p>21 the remaining sciences are only the handmaidens</p> <p>22 of the queen.</p> <p>23 We are going to speak about the</p> <p>24 model that is being developed and being used.</p> <p>25 Why four? We can't measure all we need to know</p>	<p style="text-align: right;">10</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 at every point through the Zone of Siting</p> <p>3 Feasibility. We can measure characteristics at a</p> <p>4 number of discreet points, carefully selected</p> <p>5 discrete points, and then use that to build a</p> <p>6 model that will allow us to really assess on a</p> <p>7 much finer spatial scale than we could ever hope</p> <p>8 to do by measuring.</p> <p>9 A model is important today in</p> <p>10 practically everything we do. We wake up in the</p> <p>11 morning and we look at the weather forecast, it's</p> <p>12 a model. We are going to be using a model, a</p> <p>13 numerical model. Then we are going to evaluate</p> <p>14 the model. How good are the simulations</p> <p>15 presented by the model. It will give you some</p> <p>16 indication of what the results indicate, and</p> <p>17 provide you with a summary.</p> <p>18 The science that explains the</p> <p>19 patterns of ocean circulation and the</p> <p>20 distribution of properties such as temperature</p> <p>21 and salinity. That is where we all started.</p> <p>22 Nansen, Fridtjof Nansen back in 1900 when</p> <p>23 physical oceanography really started, the</p> <p>24 Norwegian school. Somebody tried to figure out</p> <p>25 what it means in terms of circulation, and what</p>
<p style="text-align: right;">11</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 all that means in terms of herring. But we go</p> <p>3 beyond that right now, and we look at currents,</p> <p>4 circulation of the water, waves, and the effects</p> <p>5 of those flows on the movement of sediments.</p> <p>6 Of particular importance within</p> <p>7 this study, because you are asking me where the</p> <p>8 stuff is going to go, is why this stuff going to</p> <p>9 go. It is going to go because you are exerting a</p> <p>10 certain force on it. We measure that force in</p> <p>11 terms of force per unit area, which we call</p> <p>12 stress. We are all stressed at some point. This</p> <p>13 is stress. Again, capisce? Go back to our</p> <p>14 friend Sister Sarsaparilla in the fifth grade or</p> <p>15 so, and she was telling you about forces, or flow</p> <p>16 going over a surface. A change in velocity</p> <p>17 occurs as you approach the surface because you</p> <p>18 are beginning to exert force on the boundary, and</p> <p>19 as you do, you might drag it along, and you may</p> <p>20 disaggregate it, and you may break it down. So</p> <p>21 you are going to hear a lot about boundary shear</p> <p>22 stress, because the boundary is where we are</p> <p>23 working, and the shear stress is the force that</p> <p>24 may affect the form and shape of the boundary.</p> <p>25 This is a little primer I studied</p>	<p style="text-align: right;">12</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 in the past that really doesn't work, but it is</p> <p>3 one you will see in all the texts. So it is up</p> <p>4 there for you to take a look at. It really was</p> <p>5 designed for the next set of terms you are going</p> <p>6 to hear a lot, namely noncohesive sediments. The</p> <p>7 general class of noncohesive sediment which I</p> <p>8 believe we are all familiar with is beach sand,</p> <p>9 discrete, granular material, with very little</p> <p>10 binding beyond gravity. I will take questions on</p> <p>11 it later.</p> <p>12 The materials that we deal with are</p> <p>13 for the most part cohesive. They may be fairly</p> <p>14 coarse grained, and you can get sand, but they</p> <p>15 are stuck together by other stuff than simply</p> <p>16 gravity. It may be the technical term snot, at</p> <p>17 the interface, a mucilaginous matrix associated</p> <p>18 with biological activities along the boundary.</p> <p>19 You can actually stick sand together and cause it</p> <p>20 to be cohesive. But more typically what we are</p> <p>21 looking at is finer grain materials than sand.</p> <p>22 We get down well below the millimeters. We get</p> <p>23 down to the microns. 63 micron, the breakover</p> <p>24 between silt and sand. Then you get down to</p> <p>25 about 4 microns or so and you get into the clays.</p>

<p style="text-align: right;">13</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 When you get down to the really fine grains, you</p> <p>3 not only have the possibility of having a</p> <p>4 mucilaginous matrix, but you also have</p> <p>5 electrochemical binding, differences in charge of</p> <p>6 the particles. Those little magnets, they stick</p> <p>7 together.</p> <p>8 When you get down to that scale,</p> <p>9 and an awful lot of the material we are dredging</p> <p>10 tends to be fine grained silts and clays that are</p> <p>11 very cohesive, what you are looking at, in</p> <p>12 distinction from this picture that you have up</p> <p>13 here, where it is showing off an individual grain</p> <p>14 sitting up on top here, as you would with sand,</p> <p>15 really what you have is a matrix. It is all sort</p> <p>16 of glued together, and the stress tends to break</p> <p>17 down the bulk. It doesn't go off grain by grain.</p> <p>18 It tends to sit there until it was breaks down in</p> <p>19 bulk failure.</p> <p>20 Another thing to consider when you</p> <p>21 are taking a look at the boundary is the effect</p> <p>22 of the boundary on the velocity field above the</p> <p>23 boundary, (language). The boundary affects the</p> <p>24 velocity field, the flow right over that</p> <p>25 boundary. You can believe there is something up</p>	<p style="text-align: right;">14</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 here. As we get closer down to the boundary, we</p> <p>3 get closer to more and more friction, the flow is</p> <p>4 going to slow down. That gradient in velocity as</p> <p>5 we get down closer to the boundary is the stress</p> <p>6 we are talking about. There are a variety of</p> <p>7 factors that are affecting it. That is all they</p> <p>8 are trying to show you here, and you have got a</p> <p>9 rather complex velocity field. That is the</p> <p>10 vertical. Here is the velocity coming down to</p> <p>11 the boundary. You see it over here, (there were</p> <p>12 two screens along the front of the room), the</p> <p>13 velocity coming down to the boundary is rather</p> <p>14 complex because of some effects of the boundary</p> <p>15 on the flow. Another whole class to deal with</p> <p>16 that.</p> <p>17 We sometimes have panels, and this</p> <p>18 is the famous Shields diagram showing something</p> <p>19 about particle characteristics against critical</p> <p>20 erosion velocity. The only thing you can take</p> <p>21 from this is there is a significant difference</p> <p>22 between the gluey, sticky cohesive stuff and the</p> <p>23 more granular noncohesive stuff. That is really</p> <p>24 all you need to get off this. We will see more</p> <p>25 of it as we go along.</p>
<p style="text-align: right;">15</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 A table summarizing some results,</p> <p>3 laboratory and field, shows you that as you go</p> <p>4 from course sands up through progressively finer</p> <p>5 materials, getting more and more cohesive, you</p> <p>6 have got a significant change in critical shear</p> <p>7 stress values. We are looking out here at the</p> <p>8 stress, at the initiation, it is called the</p> <p>9 initiation of motion, first motion. We are</p> <p>10 getting into this in terms of Pascals. You are</p> <p>11 familiar with pounds per square inch, probably.</p> <p>12 You may have heard of millibars. That is</p> <p>13 pressure. We usually hear pounds per square inch</p> <p>14 in terms of atmospheric pressure. That tends to</p> <p>15 be a vertical pressure.</p> <p>16 This is the same sort of thing,</p> <p>17 except it is horizontal. Pounds per square inch,</p> <p>18 force per unit area. We can put it out in a</p> <p>19 variety of units, but one of the most common</p> <p>20 units is Pascals. You can Google it up and see</p> <p>21 what it means. If you care for Dynes per square</p> <p>22 centimeter, you will find it at the back, and you</p> <p>23 can convert that to pounds per square inch.</p> <p>24 But the game today, we are going to</p> <p>25 be playing mainly with Pascal, and the thing I</p>	<p style="text-align: right;">16</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 want to call your attention to for part of the</p> <p>3 discussion at least later, is an interesting</p> <p>4 variation in this critical shear stress, Tau sub</p> <p>5 C, from point 48 up to a very high value, 18.</p> <p>6 This guy is circled out at about three quarters</p> <p>7 of a Pascal for something like fine sand. As you</p> <p>8 get finer and finer material, more and more</p> <p>9 cohesive, the critical stress goes up.</p> <p>10 That is sort of counterintuitive.</p> <p>11 You believe in a kitchen if I have a pile of sand</p> <p>12 sitting on a counter and I blew on it, not much</p> <p>13 might move. But if I had a pile of flour sitting</p> <p>14 on the counter and I blew on it, a fair amount</p> <p>15 might move.</p> <p>16 So she says why is it that the</p> <p>17 coarse grained stuff actually takes less force</p> <p>18 than the fine grained stuff. The answer is</p> <p>19 cohesion, it is stuck together. If you wet up</p> <p>20 that flour, and if you have played with flour,</p> <p>21 you know you have got to sometimes scrub your</p> <p>22 hands pretty good to get rid of it, you will find</p> <p>23 that it is more difficult to move. So that is a</p> <p>24 bit counterintuitive, but it is also one of the</p> <p>25 reasons why you see so much dredged material</p>

<p style="text-align: right;">17</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 sticking around.</p> <p>3 MR. GASH: Are you taking</p> <p>4 questions now, or do you want us to wait?</p> <p>5 DR. BOHLEN: Questions later. If</p> <p>6 there is something not clear up here, please. We</p> <p>7 have a selected critical value here, something</p> <p>8 like three quarters of a Pascal and it goes up.</p> <p>9 So there are some interesting responses that you</p> <p>10 can play with.</p> <p>11 The objective of the physical</p> <p>12 oceanography study. The first thing is the Zone</p> <p>13 of Siting Feasibility, understand, is this blue</p> <p>14 guy right here.</p> <p>15 It sort of goes from Guilford over</p> <p>16 to Mattituck, right out here. You have got Long</p> <p>17 Sand Shoal and a fair piece of the Eastern Sound</p> <p>18 in here. Montauk to Block, Block to Port Judith</p> <p>19 is the Zone of Siting Feasibility, ZSF, for this</p> <p>20 study. The Environmental Impact Statement is</p> <p>21 built around that.</p> <p>22 This slide is hard to read on</p> <p>23 either side. It shows you a number of the</p> <p>24 potential dredged material disposal areas. A</p> <p>25 couple of the active ones, the Cornfield and New</p>	<p style="text-align: right;">18</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 London. You have got here a number of the</p> <p>3 historic ones. There are about six historic ones</p> <p>4 sitting in there, and there are about four new</p> <p>5 ones in there. You can see that down in the</p> <p>6 panel on the side here.</p> <p>7 The purpose, stress. Describe the</p> <p>8 distribution of maximum bottom stress magnitude</p> <p>9 expected in the zone. Characterize the</p> <p>10 circulation. Mind you, boundary shear stress is</p> <p>11 what gets this stuff moving. Then the</p> <p>12 circulation over the vertical is what transports</p> <p>13 it away from the initial point of introduction.</p> <p>14 Also recognizing that some amount of material is</p> <p>15 going to be entrained in the water column when</p> <p>16 you dispose of the material. There will be a bit</p> <p>17 of a cloud. You care about the vertical</p> <p>18 circulation as well as the boundary shear stress.</p> <p>19 Acquire physical oceanography data sufficient to</p> <p>20 calibrate, verify the model. Clear, more or</p> <p>21 less?</p> <p>22 Everybody knows where you are,</p> <p>23 right? Staten Island. You probably have some</p> <p>24 sense of the circulation in Long Island Sound,</p> <p>25 right? If I tell you that it is tidally</p>
<p style="text-align: right;">19</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 dominated, that is probably not too much of a</p> <p>3 surprise, I would hope. This is a set of</p> <p>4 stations that were occupied over the course of</p> <p>5 the Long Island Sound study. It started about</p> <p>6 1988 and ran intensively in the early 1990s, and</p> <p>7 it has been going on. A fair number of stations</p> <p>8 are still monitored by DEEP, and to some extent,</p> <p>9 DEC. The only one I want to call your attention</p> <p>10 to is this guy up here, which you can't read, and</p> <p>11 in fact, I couldn't read. I put a magnifying</p> <p>12 glass on it to determine that is M3 at the Race,</p> <p>13 East River to the Race.</p> <p>14 You recognize that one of the</p> <p>15 factors affecting circulation in the Sound is</p> <p>16 fresh water inflows, that there is a regular</p> <p>17 seasonality to your fresh water inflows. This,</p> <p>18 (pointing to next slide), comes from the</p> <p>19 Connecticut River, which represents something in</p> <p>20 excess of 70 to 80 percent of the fresh water</p> <p>21 inflow to the Sound. So you get a feeling for</p> <p>22 the seasonality, peak in April/May, typically,</p> <p>23 due to snow melt up north. That is the</p> <p>24 assumption that there is a snow melt, but that is</p> <p>25 fairly typical, and a lull in the mid summer.</p>	<p style="text-align: right;">20</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 You see that I have got a tidal</p> <p>3 influence, and I can believe that we can make</p> <p>4 this may display a monthly variation, and I have</p> <p>5 got a river influence, and it may display some</p> <p>6 seasonal variations. We have got some temporal</p> <p>7 variations in the circulation of the Sound. They</p> <p>8 show up in water temperature. This is a set of</p> <p>9 slides that shows you the April, August and</p> <p>10 December temperature profiles. At the end, here</p> <p>11 is the East River, more or less, Throgs Neck over</p> <p>12 here. You get an idea that there is a deep</p> <p>13 seasonality in the temperature profile.</p> <p>14 Again, it is all pretty much common</p> <p>15 sense. You have got to believe there may be a</p> <p>16 little bit of a time lag, but this afternoon, we</p> <p>17 are cooling down the water in the Sound. If you</p> <p>18 wait a while, it is going to get pretty cool out</p> <p>19 there. Then you are going to warm up Riverhead</p> <p>20 pretty quick. Coming through Long Island</p> <p>21 summers, you are going to warm quite fast. You</p> <p>22 are going to have a big reservoir of heat sitting</p> <p>23 out there, or cold, or absence of that.</p> <p>24 Temperature, Salinity, that change</p> <p>25 of fresh water inflow is going to show up in the</p>

<p style="text-align: right;">21</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 salinity structures. Temperature-salinity</p> <p>3 characteristics affect the density of the water</p> <p>4 column. Just like the density of the air affects</p> <p>5 atmospheric circulation, the wind, the density of</p> <p>6 the water column will affect the circulation of</p> <p>7 the water column. Now we have tides and we have</p> <p>8 got this density field operating. This is just a</p> <p>9 picture of the tidal circulation from a model on</p> <p>10 the web. If you want to Google it up, you can</p> <p>11 take a look at this guy. A little hard to see,</p> <p>12 but what is important here is the spatial</p> <p>13 variations. Much lower velocities in the western</p> <p>14 sound versus the eastern sound. We have got a</p> <p>15 lot of velocity flow through The Race. That is</p> <p>16 what you are seeing right up to here, and you can</p> <p>17 see fairly low velocities down here.</p> <p>18 If I run through a tidal cycle, you</p> <p>19 can get an idea that it is coming and going.</p> <p>20 Move it back one, that is coming in. Still</p> <p>21 pretty strong flows in the eastern Sound in the</p> <p>22 flood, and here is another flood, and here we go</p> <p>23 turning into the ebb. A little stronger on the</p> <p>24 ebb. Fair amount of spatial variation, fair</p> <p>25 amount of temporal, time, relatively short time</p>	<p style="text-align: right;">22</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 scale, six to twelve hours, and then we drag that</p> <p>3 out to the monthly cycle.</p> <p>4 Let's take a look at a little film.</p> <p>5 We will stop here for a second. This is not to</p> <p>6 impress you with the graphics, but here is the</p> <p>7 study area, right. If you look up on top, you</p> <p>8 will see a date. This is surface salinity that</p> <p>9 you are looking at.</p> <p>10 MS. ESPOSITO: Is that this year,</p> <p>11 October 22nd this year? I can't read it.</p> <p>12 DR. BOHLEN: This is October 22,</p> <p>13 2012, for a period, but the detail is not as</p> <p>14 important as the nature of the enemy. You are</p> <p>15 dealing with a system. That is what is going on.</p> <p>16 MS. ESPOSITO: Frank, is that just</p> <p>17 the surface?</p> <p>18 DR. BOHLEN: That is the</p> <p>19 surface, that is surface salinity. Of course you</p> <p>20 can see the Connecticut River coming out here,</p> <p>21 and the ebb and the flood sweeping it around.</p> <p>22 You can see the variation from higher salinities</p> <p>23 off shore to progressively lower salinities as we</p> <p>24 come in. The typical salinity variation east and</p> <p>25 west in the Long Island Sound is about four parts</p>
<p style="text-align: right;">23</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 per thousand. These guys are in units of tens of</p> <p>3 percent, tens. We call it 35 parts per thousand.</p> <p>4 You might call that 3 and a half percent.</p> <p>5 Salinities are normally marked out in parts per</p> <p>6 thousand. On this guy here, you will see it goes</p> <p>7 32, 31, 30, that is 3 percent salt.</p> <p>8 Oceanographers always deal with 4 decimal points</p> <p>9 within a 31.4450.</p> <p>10 That is the system we are dealing</p> <p>11 with, sort of on average. If we keep running it</p> <p>12 long enough, actually, and it would take half an</p> <p>13 hour to tell you about how the system responded</p> <p>14 to Sandy, because October 29th was Sandy. We</p> <p>15 just walked by Sandy. Go back to the slide.</p> <p>16 This just gives you an idea that</p> <p>17 not only are we worrying about spatial variations</p> <p>18 in temperature salinity, and some of the temporal</p> <p>19 variations that go along with them, but we also</p> <p>20 have to care about the waves. Surface waves have</p> <p>21 a velocity associated with them that interacts</p> <p>22 with the tidal and the density driven velocity</p> <p>23 field. So we have to worry about that, and this</p> <p>24 is just showing you two areas, one a little north</p> <p>25 of Montauk here, and the other sitting over here</p>	<p style="text-align: right;">24</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 by Orient Point, and some of the wave</p> <p>3 characteristics as we wander down here. That is</p> <p>4 all you are looking at here. The significance of</p> <p>5 the blue and the red in this, we are not talking</p> <p>6 about that right now. That is actually a model</p> <p>7 run to compare, observed to a model. But what</p> <p>8 you are getting out of this is that there is some</p> <p>9 significant spatial variability in wave heights,</p> <p>10 as you start marching into the Sound. Again, not</p> <p>11 terribly surprising because of the sheltering and</p> <p>12 because of the shallows.</p> <p>13 What is the distribution and</p> <p>14 spatial variations in the bottom stress, where</p> <p>15 are the regions in which the maximum stress are</p> <p>16 the smallest, and where, if the stuff does get</p> <p>17 stirred up, does it go. Sort of pretty</p> <p>18 fundamental questions. The model, Grant</p> <p>19 McCardell.</p> <p>20 DR. MCCARDELL: Hello, everybody.</p> <p>21 I am Grant McCardell, also from the University of</p> <p>22 Connecticut. I am going to be talking some about</p> <p>23 the model we have developed to look at</p> <p>24 distribution of the stresses.</p> <p>25 You saw an example of the model</p>

<p style="text-align: right;">25</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 output just a few moments ago with that movie of</p> <p>3 the surface salinity. The reason we run models,</p> <p>4 as Dr. Bohlen stated, is because we are unable to</p> <p>5 go out there and make measurements over every</p> <p>6 single space at every single time. So we make</p> <p>7 some measurements at certain times, at certain</p> <p>8 locations, and we use those to be able to what we</p> <p>9 call tune a model. We then have to hope that the</p> <p>10 model is replicating reality, at least to a</p> <p>11 certain extent, in order to use the model to make</p> <p>12 predictions about what might or might not be the</p> <p>13 current during more extreme events, and in other</p> <p>14 locations. That is where we have areas.</p> <p>15 The model that we are using is</p> <p>16 nested within a bigger model. It is nested</p> <p>17 within a model of the northeast coast and the</p> <p>18 northwest Atlantic. It is forced by tides, it is</p> <p>19 forced by observed flows, so we go and we get</p> <p>20 historic data, or get the model run from USGS</p> <p>21 stations.</p> <p>22 It is forced by climatology, and by</p> <p>23 "climatology" here, what I am referring to is</p> <p>24 "what are the average conditions at a given space</p> <p>25 and date?" So the climatology for Riverhead, New</p>	<p style="text-align: right;">26</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 York for today's date might be that the average</p> <p>3 temperature is 35 degrees, and that is what we</p> <p>4 were using. So that is what we mean by</p> <p>5 climatology terms.</p> <p>6 We also use climatology for the</p> <p>7 initial conditions. When you run a model, you</p> <p>8 have got to start somewhere, when we run this</p> <p>9 model long enough before the study period that is</p> <p>10 we are using the conditions for that actual</p> <p>11 period.</p> <p>12 What is a model? The model that we</p> <p>13 use is called a primitive equation model. By</p> <p>14 primitive equation, we mean that it is based on</p> <p>15 first principles, it is based on Newton's laws</p> <p>16 that were developed in the 17th Century by Sir</p> <p>17 Isaac Newton. Those laws were further expanded</p> <p>18 to fluid dynamics in the 19th Century. It is a</p> <p>19 set of equations called the Navier-Stokes</p> <p>20 equations. Those are very well thought to</p> <p>21 represent fluid flow. They even model turbulence</p> <p>22 and all sorts of things. They are very rich sets</p> <p>23 of equations.</p> <p>24 They are a rich set of equations</p> <p>25 that lend themselves to computer models. They</p>
<p style="text-align: right;">27</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 did not lend themselves very well to analytic</p> <p>3 solutions in the 19th Century, but they have lent</p> <p>4 themselves very well to be able to use high speed</p> <p>5 numerical computers to represent these equations,</p> <p>6 and then simulate the motion of fluids. The same</p> <p>7 sets of equations are used in ocean models. They</p> <p>8 are also used in atmospheric models. So when you</p> <p>9 looked at the weather forecast this morning, it</p> <p>10 is because someone had run a primitive equation</p> <p>11 model on the current conditions from yesterday,</p> <p>12 and extended that to be able to tell you what</p> <p>13 tomorrow is likely to be like.</p> <p>14 In the model, the bottom stress</p> <p>15 magnitude -- which is what we are interested in</p> <p>16 here for the purposes of this study -- is</p> <p>17 computed according to the formula that you see</p> <p>18 down here. It is Tau equals Rho -- Rho is the</p> <p>19 water density -- times Cd. Cd is just a</p> <p>20 constant. We normally take it to be point zero</p> <p>21 zero two five. It varies somewhat, but</p> <p>22 spatially, different studies vary. Then that is</p> <p>23 times the square of the water velocity. So in</p> <p>24 other words, if I double the water velocity, I</p> <p>25 increase the stress four fold. This also makes</p>	<p style="text-align: right;">28</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 bottom friction non linear, which means that</p> <p>3 these models behave in a non linear fashion,</p> <p>4 which means that the models really are a pretty</p> <p>5 complex source of behavior.</p> <p>6 Here is what our grid looks like to</p> <p>7 the bottom of your right. Again, this is nested</p> <p>8 within a bigger model that covers the rest of the</p> <p>9 shelf out here and then up to the northwest</p> <p>10 Atlantic, and this is our model. It contains</p> <p>11 about 30,000 triangular elements, each one of</p> <p>12 which contains 15 depth elements. So we have got</p> <p>13 a total of about 500,000 volume elements running</p> <p>14 this model.</p> <p>15 In red right there, what I am</p> <p>16 showing is the area of our study. So red is the</p> <p>17 area of the study, and here it is to that red</p> <p>18 area. You can see that this model is made of</p> <p>19 discrete triangular mesh. It is important to</p> <p>20 realize that the resolution of this mesh is also</p> <p>21 the resolution of the output of this model. It</p> <p>22 is certainly much better than any survey we could</p> <p>23 ever do. We could not take a ship and survey</p> <p>24 every single one of those little triangles, nor</p> <p>25 could we go put buoys in every single one of</p>

<p style="text-align: right;">29</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 those little triangles. But it is nevertheless</p> <p>3 of limited resolution. If we want even higher</p> <p>4 resolution than that because you want to know</p> <p>5 what is happening at Point Judith right at the</p> <p>6 pier, we can nest even finer triangles within</p> <p>7 this mesh. But it is impractical to use finer</p> <p>8 scale triangles over this domain, and we need to</p> <p>9 get the flow right over this domain to able to</p> <p>10 get the flows right at a finer scale.</p> <p>11 So the current resolution is about</p> <p>12 one to five hundred meters, which is about a</p> <p>13 quarter of a mile, which is a fine enough</p> <p>14 resolution to distinguish between potential</p> <p>15 dredge sites, but it is not a fine enough scale</p> <p>16 to talk about moving the boundary 100 feet east</p> <p>17 or west.</p> <p>18 We wonder how well does the model</p> <p>19 work. We have calibrated it. We have calibrated</p> <p>20 it using sea level heights, and we use sea level</p> <p>21 heights throughout Long Island Sound and New York</p> <p>22 Harbor. We also calibrated it using records of</p> <p>23 temperatures that we have, records of salinity</p> <p>24 that we have. As far as how well the model</p> <p>25 does, it really does quite well. I would call it</p>	<p style="text-align: right;">30</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 state of the art in terms of oceanography</p> <p>3 readings. We have got skills of 90 percent or</p> <p>4 better for sea level height, water currents,</p> <p>5 temperature and salinity.</p> <p>6 With that, we are going to talk</p> <p>7 more now about evaluating our model compared to</p> <p>8 stress. Dr. Bohlen is going to talk more about</p> <p>9 that.</p> <p>10 DR. BOHLEN: So you are a skeptic</p> <p>11 about this model stuff. We all are. We live</p> <p>12 with skepticism. A little bit of cynicism but a</p> <p>13 lot of skepticism. So we are going to go back</p> <p>14 out and we are going to measure at a discrete</p> <p>15 number of points. Deploy instruments, and the</p> <p>16 instruments are mounted on bottom frames. You</p> <p>17 will see them in a minute. We did talk about</p> <p>18 buoys, the buoy floats. There may be a little</p> <p>19 lobster pot to help us sort of find it, but the</p> <p>20 measurements that we are taking are using bottom</p> <p>21 mounted arrays.</p> <p>22 Here they are. Seven bottom</p> <p>23 mounted tripods, three two-month observation</p> <p>24 Campaigns to try to get a feeling for some of</p> <p>25 this time variation that we were seeing earlier.</p>
<p style="text-align: right;">31</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 We know that we are never quite where we want to</p> <p>3 be. It used to get to be a curse if they see us</p> <p>4 walking down the dock and know there is a storm</p> <p>5 coming.</p> <p>6 You would like to have it out there</p> <p>7 for a fair range of conditions, and you can</p> <p>8 believe that the conditions in the summer are</p> <p>9 somewhat different than the conditions in the</p> <p>10 winter, or the conditions during the seasonal</p> <p>11 transition, spring and fall seasonal transition</p> <p>12 are going to be different than the winter.</p> <p>13 So we tried to pick three periods</p> <p>14 where a variety of conditions are going to be</p> <p>15 seen time wise. Then we are going to try site</p> <p>16 these seven stations that you see here in red at</p> <p>17 a number of locations where we might expect to</p> <p>18 see spatial differences in bottom shear stress.</p> <p>19 So we get a range of conditions, gather up that</p> <p>20 data and come back and use them to verify,</p> <p>21 evaluate the accuracy of the model. Clear?</p> <p>22 Here are the periods. Our spring</p> <p>23 period is March through May. About each one of</p> <p>24 these is on the order of 60 days, you see</p> <p>25 everything. The spring period you saw on that</p>	<p style="text-align: right;">32</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 river discharge chart is a time when you expect</p> <p>3 to see elevated river discharge, and it might be</p> <p>4 windy as well. For those of us that live on the</p> <p>5 water, the spring can be pretty windy around</p> <p>6 here. Then the summer, lower river flow, and</p> <p>7 again for those guys that are sailors, you know</p> <p>8 when it gets nice and warm, the wind dies.</p> <p>9 Generally lower energy. Come winter, lower river</p> <p>10 flow, but with high wind. So three Campaigns.</p> <p>11 You will see this Campaign number one, two and</p> <p>12 three.</p> <p>13 Here are the frames. Pretty</p> <p>14 standard stuff today, with the exception of this</p> <p>15 little guy that sits down here that says Nortek,</p> <p>16 which is the manufacturer of acoustic Doppler</p> <p>17 current profiler, ADCP. That is what you are</p> <p>18 going to hear a lot about in this study, but more</p> <p>19 and more, you are going to hear about it when</p> <p>20 people talk about measuring currents. We don't</p> <p>21 put a single current meter out any more. We</p> <p>22 actually have a single current meter at the</p> <p>23 bottom that allows us to take measurements of the</p> <p>24 whole of the vertical, or at the surface and take</p> <p>25 measurements over the whole of the vertical.</p>



<p style="text-align: right;">33</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 Very, very useful tool.</p> <p>3 This Nortek I said was a little bit</p> <p>4 revolutionary in the game. It is what they call</p> <p>5 a pulse coherent acoustic Doppler current</p> <p>6 profiler, meaning that you can make very small</p> <p>7 measurements. The RDI that sits up on top of the</p> <p>8 ADCP, that is the upper looking guy, that is</p> <p>9 measuring about once every meter over the</p> <p>10 vertical. The Nortek measures centimeters over</p> <p>11 the bottom three quarters of a meter. So really</p> <p>12 fine slicing down to the boundary, which is what</p> <p>13 we care about. Remember? We really want to get</p> <p>14 those measurements down to the bottom. Grant</p> <p>15 showed you the equation, the square of the</p> <p>16 velocities, the east west velocity and the north</p> <p>17 south velocity. We are really able to measure</p> <p>18 those accurately right down to the bone, and we</p> <p>19 can with the Nortek. This thing, (the frame),</p> <p>20 also has a temperature salinity sensor sitting</p> <p>21 over here, and a couple of probes along here, and</p> <p>22 another one here that says OBS, Optical Back</p> <p>23 Scatter, so we can measure the concentration of</p> <p>24 stuff in the water column.</p> <p>25 This will sample, burst sample</p>	<p style="text-align: right;">34</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 maybe four times an hour a whole array for a</p> <p>3 couple of thousand samples. So you can get a lot</p> <p>4 of data on the structure of the flow both over</p> <p>5 the vertical, we are looking for far field</p> <p>6 effects over the vertical, and in terms of</p> <p>7 resuspension, the boundary shear stress at these</p> <p>8 points. They are discrete points, and that is</p> <p>9 what you are measuring; water column currents and</p> <p>10 waves, currents near the sea floor, stress,</p> <p>11 suspended sediment concentration and temperature</p> <p>12 and salinity. That frame stands about 6 feet</p> <p>13 high or so, and about 8, 10 feet triangular.</p> <p>14 When we were out there working on</p> <p>15 the frames, changing batteries and so forth, we</p> <p>16 had to get out there, so you run a ship out from</p> <p>17 Avery Point to the stations. Along the way, you</p> <p>18 take temperature and salinity measurements at a</p> <p>19 number of points. This is a conductivity</p> <p>20 temperature depth profiler, profiling</p> <p>21 conductivity temperature depth, CTD, along with a</p> <p>22 series of bottles in here. So as you are</p> <p>23 lowering it down, you can take discrete water</p> <p>24 samples over the vertical, and bring those</p> <p>25 samples back. That allows you to calibrate your</p>
<p style="text-align: right;">35</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 instruments. The OBS is an optical sensor</p> <p>3 looking at what is in suspension. How do you</p> <p>4 know that it really is telling you the truth?</p> <p>5 You draw some water samples, filter them down,</p> <p>6 compare them with the OBS. That is what the</p> <p>7 water samples allow you to do. You get your</p> <p>8 temperature and salinity from that as well .</p> <p>9 Sediment samples. For each station</p> <p>10 that we are doing the CTD Cast, we will also get</p> <p>11 a sediment grab. We will get an idea of the</p> <p>12 distribution of the sediment in the study area as</p> <p>13 well.</p> <p>14 This is just showing you some of</p> <p>15 the ship's track. It doesn't really mean very</p> <p>16 much because yesterday, the track didn't look</p> <p>17 like that, and tomorrow, it probably won't look</p> <p>18 like that again. You get from station to</p> <p>19 station, depending on how the weather goes.</p> <p>20 The data recovery. This is an</p> <p>21 interesting slide. The data recovery is pretty</p> <p>22 good. You have three Campaigns, one, two, three</p> <p>23 in each of these boxes. The first guy shows you</p> <p>24 temperature salinity, and it shows you pretty</p> <p>25 much blue, which says full or near full data</p>	<p style="text-align: right;">36</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 recovery, greater than 50 percent. You have got</p> <p>3 a lot of temperature salinity there. You go out</p> <p>4 here and you say currents and suspended sediments</p> <p>5 near the sea floor. That is that Nortek ADCP.</p> <p>6 The pulse coherent guy that is looking at the</p> <p>7 bottom 75 centimeters or so. You see the blues</p> <p>8 are in the middle guy, lighter blue here and</p> <p>9 yellow.</p> <p>10 The first time we put this guy out,</p> <p>11 the manufacturer had claimed a certain life of</p> <p>12 the batteries. So we figured we would go out</p> <p>13 once at the beginning and once at the end of the</p> <p>14 deployment period, change up the batteries. We</p> <p>15 went out there after about a week or two to check</p> <p>16 things out, and the batteries were bad. So that</p> <p>17 is why the Campaign One data recovery rate is</p> <p>18 somewhat lower than it was in the other</p> <p>19 Campaigns.</p> <p>20 Same thing goes for the two zeroes</p> <p>21 down here for ADCP's. This is now just telling</p> <p>22 you some of the problems of doing this kind of</p> <p>23 measurement. These two instruments were sent</p> <p>24 back to the manufacturer for refurbishment, and</p> <p>25 sent back all refurbished, ready to go with the</p>

<p style="text-align: right;">37</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 wrong firmware. You put it in the field, and you</p> <p>3 get no data, that sort of thing. But overall</p> <p>4 when you are taking a look through this, you say</p> <p>5 the data recovery rates are well in excess of 50</p> <p>6 percent, and probably bordering on 80 percent for</p> <p>7 a lot of the sensors.</p> <p>8 DR. MCCARDELL: We did not expect</p> <p>9 to have that percent. 50 percent was what was</p> <p>10 anticipated.</p> <p>11 DR. BOHLEN: A few years ago, if</p> <p>12 you got 10 or 20 percent, you would really be</p> <p>13 feeling good. Just some examples of the</p> <p>14 observations. This is mean flow, an average,</p> <p>15 near the bottom. This is the RDI, the ADCP that</p> <p>16 is looking up. You are 3 meters off the sea</p> <p>17 floor here, and this is the long term net drift.</p> <p>18 This is not an instantaneous measurement, it is</p> <p>19 an average over many tidal cycles.</p> <p>20 You can see it here, if you look</p> <p>21 carefully at these, you will see they are three</p> <p>22 different colors in every one of these. You can</p> <p>23 see in general, the near bottom flow will</p> <p>24 generally drift into the Sound. It is a</p> <p>25 characteristic estuarine flow.</p>	<p style="text-align: right;">38</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 You have the higher density,</p> <p>3 saltier water at the bottom, and it tends to</p> <p>4 migrate into the estuary, as opposed to the</p> <p>5 characteristic fresher, lighter surface waters</p> <p>6 that tend to migrate out. The waters of Long</p> <p>7 Island Sound are not getting fresher and fresher</p> <p>8 as the Connecticut River water comes in, so where</p> <p>9 is it going? Out. You have got a characteristic</p> <p>10 in at the bottom under the surface, and that is</p> <p>11 what you are looking at here.</p> <p>12 This is now at a particular level,</p> <p>13 and we are going to come all the way up for you.</p> <p>14 It is just that they picked 3 meters here. This</p> <p>15 is the Nortek now, about a half a meter from the</p> <p>16 sea floor. It is the same sort of thing. You</p> <p>17 get an idea of the magnitude. The magnitude is</p> <p>18 shown in here on the order of 10 centimeters a</p> <p>19 second once again. Capiisce? 10 centimeters a</p> <p>20 second? Are you comfortable with 10 centimeters</p> <p>21 a second? You don't have to lie to me.</p> <p>22 A nautical mile per hour, one knot,</p> <p>23 nautical mile per hour, 50 centimeters a second.</p> <p>24 Does that give you a feeling for what 10 cm/sec</p> <p>25 is? Better? That is a mile per hour, sort of</p>
<p style="text-align: right;">39</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 like in a car, a little bit more, 6,080 feet,</p> <p>3 instead of 5,000 and some. So just to give you</p> <p>4 an idea, 10 centimeters a second as the average</p> <p>5 drift, pretty slow. 30 centimeters a second is a</p> <p>6 foot per second. So that is the drift, that is</p> <p>7 the average drift. You stir this stuff up and it</p> <p>8 is going to go back and forth, back and forth,</p> <p>9 back and forth, and it is going to keep marching</p> <p>10 out at the surface. At the bottom, back and</p> <p>11 forth, back and forth, back and forth, marching</p> <p>12 in. On average, about 10 centimeters a second,</p> <p>13 the average flow rate. Clear?</p> <p>14 This is just showing a little bit</p> <p>15 about the tidal amplitudes in that these are</p> <p>16 tidal ellipses for each of the Campaigns. Again,</p> <p>17 what you are seeing roughly, this is now over the</p> <p>18 vertical. The M2 is the principal lunar</p> <p>19 component of the tide. You will see that</p> <p>20 generally things are acting along the axis of the</p> <p>21 system, which is about what you would expect.</p> <p>22 You can get some idea of the magnitude on this</p> <p>23 whole thing. This is a graphic. That is about a</p> <p>24 half a meter per second over here. So you get an</p> <p>25 idea that you have on the order of a knot or so</p>	<p style="text-align: right;">40</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 max flows down in here. As you get down further</p> <p>3 out in here, the velocities go down, which is</p> <p>4 what you are seeing ad nauseam. You saw it in</p> <p>5 the first model, you saw it in the project model.</p> <p>6 With the wave statistics, one of</p> <p>7 the things we are looking at here is the extent</p> <p>8 to which the waves are influencing bottom shear</p> <p>9 stress. One of the questions is always sensitive</p> <p>10 to areas that are going to be influenced by the</p> <p>11 waves. To make a long story short here, what</p> <p>12 these data are showing, there is a difference.</p> <p>13 In our bottom stress profiles in here, we are</p> <p>14 looking at time against the magnitude of the</p> <p>15 bottom stress. You will see this is the</p> <p>16 spring/neap monthly cycle, the stress as you are</p> <p>17 looking at moving up here. Up here is time, and</p> <p>18 this is wave amplitude varying over the period.</p> <p>19 What you would like to see, if there was a neat</p> <p>20 correlation between the two, is the influence of</p> <p>21 the wave on the bottom stress.</p> <p>22 To make a long story short here,</p> <p>23 probably not surprisingly, there isn't much of a</p> <p>24 correlation, because the stations are, for the</p> <p>25 most part, outside of "the wave base," the area</p>

<p style="text-align: right;">41</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 that you expect to be influenced by waves. Which</p> <p>3 makes sense because you want to set a site for</p> <p>4 disposal of materials that tends to have as few</p> <p>5 influences to move this stuff around as possible.</p> <p>6 The guy on the bottom is showing</p> <p>7 you a relationship between velocity and the</p> <p>8 distance over the vertical, and it is just</p> <p>9 showing you there is a difference at the two</p> <p>10 sites as we are coming in here, at the two times</p> <p>11 as you are coming in here. This is another site</p> <p>12 looking at the same thing, and probably the same</p> <p>13 answer.</p> <p>14 One of the things I didn't point</p> <p>15 out, and you may have missed on the very first</p> <p>16 slide that had the Zone of Siting Feasibility, is</p> <p>17 around the margin of it was a gray border. That</p> <p>18 has been defined by the Army Corp and EPA as the</p> <p>19 area where you are too close to shore, and you</p> <p>20 may be more likely subject to wave influence. So</p> <p>21 that is looking pretty good so far from these</p> <p>22 data.</p> <p>23 DR. MCCARDELL: Because it is</p> <p>24 shallower.</p> <p>25 DR. BOHLEN: Because it is</p>	<p style="text-align: right;">42</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 shallower. I thought that went without saying,</p> <p>3 right. Closer to shore is shallower.</p> <p>4 MS. PURNELL: Is that set at 14</p> <p>5 feet? Is the boundary set at 14 feet?</p> <p>6 DR. BOHLEN: I don't know.</p> <p>7 DR. HAY: 18 meters.</p> <p>8 DR. BOHLEN: 17, 18 meters.</p> <p>9 MS. PURNELL: Thank you.</p> <p>10 DR. BOHLEN: We can argue about</p> <p>11 the 17 or 18, but it is not going to affect it.</p> <p>12 This gets a little esoteric for you. This is the</p> <p>13 plot that Grant, when he was talking about the</p> <p>14 model formulation, he said he was going to be</p> <p>15 using a formula that had a drag coefficient in</p> <p>16 it, and he mentioned just sort of off hand, our</p> <p>17 drag coefficient, C sub d, is generally on the</p> <p>18 order of .0025. This was a plot to check out</p> <p>19 whether that made any sense or not. What we are</p> <p>20 taking a look at here is a log plot sitting along</p> <p>21 here. There is a log law down in here, and there</p> <p>22 is a bulk formula on here. If everything on the</p> <p>23 vertical bulk formula, on the horizontal log law,</p> <p>24 if everything was fine, it would be laying along</p> <p>25 a single line, a log law.</p>
<p style="text-align: right;">43</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 It looks pretty good on this,</p> <p>3 laying along a single line until you get up in</p> <p>4 the vicinity of about a Pascal. When you get up</p> <p>5 to a Pascal or so, that begins to break down a</p> <p>6 little bit. This is where the complications come</p> <p>7 in. Why for? Because all sorts of things at</p> <p>8 this point start influencing the characteristic</p> <p>9 of the near bottom velocity field, the velocity</p> <p>10 over the vertical, the boundary layer when you</p> <p>11 get down to there. When you begin to stir up</p> <p>12 sediment into the water column, you begin to</p> <p>13 change the relationships that govern the</p> <p>14 distribution of the velocity over the vertical,</p> <p>15 the friction characteristics of the flow change.</p> <p>16 You can also change the pressure distributions at</p> <p>17 the bottom as they affect the flow field.</p> <p>18 That is being verified here really</p> <p>19 as you see, you get up here pretty well, and you</p> <p>20 begin to break off somewhere around, if you can</p> <p>21 see it, right around here. Then you get off and</p> <p>22 say how many things are going on. But the long</p> <p>23 and short of this one is that the measurements</p> <p>24 using the log law support the use of the bulk</p> <p>25 formula with a drag coefficient of about .0025,</p>	<p style="text-align: right;">44</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 up to at least one Pascal.</p> <p>3 I thought this was hard to see, and</p> <p>4 it may be that I am getting color blind as my age</p> <p>5 passes, but one of the things this is showing you</p> <p>6 is that model simulations reproduce tidal and the</p> <p>7 spring neap variations on the observed stress</p> <p>8 very well. You have got a neap, spring neap</p> <p>9 variation. Do you understand spring neap? Is</p> <p>10 that all right?</p> <p>11 The monthly variations, twice</p> <p>12 monthly variations. We are near full moon tide</p> <p>13 right now. You drive down Route 25 this morning,</p> <p>14 this afternoon, and high water is pretty near the</p> <p>15 road. That is not counting what is going to</p> <p>16 happen when it is going to blow for the next day</p> <p>17 and a half. We get off the full moon, and the</p> <p>18 tidal excursion (range) is somewhat reduced. We</p> <p>19 get back on the new moon, and it is increased.</p> <p>20 That is the spring/neap cycle. That spring has</p> <p>21 got nothing to do with May June either.</p> <p>22 What you are seeing here is a</p> <p>23 variation over the course of about 14 days or so</p> <p>24 of a spring neap cycle. You can see, if you can</p> <p>25 see it, if the blues and the purples weren't so</p>

<p style="text-align: right;">45</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 close together, that the model is doing an</p> <p>3 excellent job of reproducing the stress that is</p> <p>4 measured from the array.</p> <p>5 DR. MCCARDELL: The model is in</p> <p>6 red, and the data are in blue.</p> <p>7 DR. BOHLEN: You can see it down</p> <p>8 at the end in the blue. That is why they dove</p> <p>9 off the end down in here. There is no data out</p> <p>10 there. So we got a pretty good feeling for that.</p> <p>11 Here, we are looking at a</p> <p>12 comparison between the measured and observed</p> <p>13 again. This is now the model, modeled and</p> <p>14 observed or modeled and measured. This is the</p> <p>15 model and this is the observed, and you can see</p> <p>16 if there was a perfect fit, a one to one fit,</p> <p>17 everything would be laying on this line right</p> <p>18 here. So it is just a slight variation for the</p> <p>19 means, these are the mean velocities now. Then</p> <p>20 for the max in here, it is a little coarser. The</p> <p>21 R squared is about point 7 in here (the maximum</p> <p>22 value). It is something over point 9 in the case</p> <p>23 of the means. But in the world of modeling</p> <p>24 versus measuring, those correlations are</p> <p>25 excellent. That is a high correlation. You are</p>	<p style="text-align: right;">46</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 very happy with how well your model can do for</p> <p>3 you when you are talking about those kinds of</p> <p>4 values.</p> <p>5 MS. PURNELL: Again, that data and</p> <p>6 the prior slide's data, that averages over all</p> <p>7 seven of those arrays? Is that how you came to</p> <p>8 that?</p> <p>9 DR. BOHLEN: I had forgotten what</p> <p>10 I had on this one. Yes, it is.</p> <p>11 DR. MCCARDELL: Yes, it covers</p> <p>12 the stress during the entire Campaign.</p> <p>13 DR. BOHLEN: For all seven arrays.</p> <p>14 DR. MCCARDELL: The maximum amount</p> <p>15 of stress during the entire Campaign.</p> <p>16 DR. BOHLEN: Right. One of them,</p> <p>17 I had just one Campaign. Here is the analysis.</p> <p>18 Find the maximum bottom stress magnitude at each</p> <p>19 point in the Zone of Siting Feasibility in the</p> <p>20 three Campaigns, compare the values at sites</p> <p>21 identified in the screening process. That is the</p> <p>22 sites considered potential disposal areas. To</p> <p>23 simulate the period and the characteristics that</p> <p>24 you might expect during a storm, Sandy came to</p> <p>25 mind.</p>
<p style="text-align: right;">47</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 Here is the Bathymetry, water</p> <p>3 depths through the study area, and these are the</p> <p>4 stations, DOTs, groups, and the sites. You get</p> <p>5 an idea of what the water depths look like</p> <p>6 through the system. Are you comfortable with</p> <p>7 that? Pretty deep in the vicinity of the arrays.</p> <p>8 Montauk, - shallow is here. Is that okay?</p> <p>9 Stress values. Here are your</p> <p>10 stresses in Pascals. Reds are three, and that</p> <p>11 number that we were playing with in that panel</p> <p>12 before, point 75 or so, is somewhere down in the</p> <p>13 blues, down in here. So if we say that a fair</p> <p>14 amount of the area in the Zone of Siting</p> <p>15 Feasibility has got fairly high stress, that is</p> <p>16 what that guy is saying.</p> <p>17 The one thing that is interesting</p> <p>18 is that the spatial differences, if we run this</p> <p>19 now for each of the Campaigns, and we can go</p> <p>20 beyond the Campaigns now that we have a model, we</p> <p>21 can run it every month if we care to, you are</p> <p>22 going to find that the spatial differences are</p> <p>23 much larger than the seasonal variations.</p> <p>24 Which sort of makes sense because</p> <p>25 you figure that wind and wind waves are probably</p>	<p style="text-align: right;">48</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 the primary factor affecting the turbulence over</p> <p>3 the vertical. We were seeing before that wind</p> <p>4 and wind waves have relatively little effect on</p> <p>5 bottom shear stress in the area that we are</p> <p>6 picking. You have got to get much closer to the</p> <p>7 beach to find that.</p> <p>8 So to give you a sense of what the</p> <p>9 stresses look like, you are within a one and a</p> <p>10 half Pascals sort of range up in there. You get</p> <p>11 up into Fishers Island Sound or close to Fishers</p> <p>12 Island Sound, you are getting down to your point</p> <p>13 7 or so. You get out into here, you get down</p> <p>14 around Montauk, you are up around 2 and behind</p> <p>15 Montauk.</p> <p>16 Maximum bottom stress during storm</p> <p>17 conditions we observed through each of the</p> <p>18 Campaigns; one two and three. You can see this,</p> <p>19 we are allowed to go through this now and pick</p> <p>20 out different seasons, different locations.</p> <p>21 Cornfield is fairly high. That starts dropping</p> <p>22 down. This is Eastern Long Island Sound, Six</p> <p>23 Mile Reef, Clinton, Orient Point, New London.</p> <p>24 Then we go Block Long Island Sound,</p> <p>25 outside of Eastern Long Island Sound, however you</p>

<p style="text-align: right;">49</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 want to divide it. Fishers, this is the south</p> <p>3 side of Fishers near the deep hole for Fishers.</p> <p>4 Values similar to Clinton. You can sit and play</p> <p>5 with this. This is the kind of information that</p> <p>6 you will have to play with as you go through.</p> <p>7 That just summarizes some of the sites against</p> <p>8 that plot you had before.</p> <p>9 Sandy. This should come as no</p> <p>10 surprise, the results from the Sandy analysis if</p> <p>11 you lived here during Sandy. You had some winds.</p> <p>12 This is now Ledge Light, tip of Long Island</p> <p>13 Sound, west of Long Island Sound and the Bronx.</p> <p>14 You have got some winds at Ledge Light that might</p> <p>15 get up to 60 miles an hour. Is that a lot of</p> <p>16 wind? It is not an afternoon sailing breeze, not</p> <p>17 around here, but it is a fair amount of wind.</p> <p>18 But this is not the 100 year storm event, wind</p> <p>19 wise. It is just sort of a husky afternoon</p> <p>20 sailing breeze. You can get a 50 knot blow</p> <p>21 nearly every year, every other year.</p> <p>22 MS. ESPOSITO: We are supposed to</p> <p>23 get 50 mile per hour winds tomorrow.</p> <p>24 DR. BOHLEN: We might get 50 mile</p> <p>25 per hour winds tomorrow, so there you are, call</p>	<p style="text-align: right;">50</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 me a liar. Again, any time you look at these</p> <p>3 things, you sort of scale them out, what do they</p> <p>4 look like, what do they feel like. Again, the</p> <p>5 impressive thing about Sandy that made it</p> <p>6 memorable was the surge, and the impressive thing</p> <p>7 about Sandy that made it memorable was the surge</p> <p>8 down towards New York. In this case, this is</p> <p>9 Kings Point, this is in Long Island Sound. In</p> <p>10 Kings Point, there is a surge up here on the</p> <p>11 order of 4 meters. We get down to the eastern</p> <p>12 end of things, on the order of one and a half to</p> <p>13 2 meters.</p> <p>14 So we have a pretty good surge down</p> <p>15 at our end. It has got a recurrence on the order</p> <p>16 of 30 to 40 years sort of a thing. When you get</p> <p>17 down to the western end of Long Island Sound and</p> <p>18 New York Harbor, you have got a recurrence</p> <p>19 interval of once every 1,000 to hundreds of years</p> <p>20 or so. That is what got the attention, besides 8</p> <p>21 million people, to Sandy.</p> <p>22 Superstorm Sandy, our analysis of</p> <p>23 that, running it in, created higher maximum</p> <p>24 amount of stresses in some areas, and most of</p> <p>25 those areas were closer to shore, sitting in</p>
<p style="text-align: right;">51</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 here. If you ran this guy against the slide I</p> <p>3 showed you earlier, which was the results of the</p> <p>4 model that is running through every year, and no</p> <p>5 Sandy in that, you won't see an awful lot of</p> <p>6 difference. You will some spatial variability in</p> <p>7 areas where you would expect to see more reds up</p> <p>8 along the shallows. It makes sense.</p> <p>9 Sandy was, for the most part, a</p> <p>10 southeasterly storm here. It went northeasterly</p> <p>11 as it got close. Southeast, this way, east this</p> <p>12 way. That's when you have got your good winds</p> <p>13 and you have got some good waves and you have got</p> <p>14 some good stresses acting against, you all know</p> <p>15 what, residual flows. You stuff a lot of water</p> <p>16 down at the western end of the Sound, and it has</p> <p>17 got to go somewhere. It comes back out. It is</p> <p>18 the interaction of the tidal wave with the</p> <p>19 outflow of water that produces some interesting</p> <p>20 turbulence, and increases the chance of change in</p> <p>21 boundary shear stress. So the picture here is</p> <p>22 fairly complicated, but it didn't turn everything</p> <p>23 red at all, is the moral of this story. But I</p> <p>24 suppose you could find me a higher energy storm.</p> <p>25 Start looking around for it.</p>	<p style="text-align: right;">52</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 This is now the Superstorm Sandy</p> <p>3 conditions, and again, you are running these up</p> <p>4 against what we had before, and you see New</p> <p>5 London along on the eastern Sound and Cornfield,</p> <p>6 Six Mile. Six Mile is out in the water a little</p> <p>7 bit more, a little bit higher. These numbers</p> <p>8 aren't terribly much different than what we saw</p> <p>9 before. In fact, in some areas, you might see</p> <p>10 the stresses a little bit lower because of the</p> <p>11 complexity of the interaction of the flow.</p> <p>12 We define a stress level based on</p> <p>13 historical data and literature. Based on a</p> <p>14 review, we chose point 75 Pascal as something of</p> <p>15 a design threshold. You can make it higher,</p> <p>16 you can make it a little bit lower, you can sit</p> <p>17 and argue about it but this is a work in</p> <p>18 progress. But you have the data to progress, to</p> <p>19 do that sort of testing. The model is looking</p> <p>20 pretty good. The results of the model are</p> <p>21 impressive.</p> <p>22 Critical shear stress, if you</p> <p>23 listened to what I told you before, the manner of</p> <p>24 setting up a critical shear stress for cohesive</p> <p>25 materials is complicated. It depends on grain</p>

<p style="text-align: right;">53</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 size fraction at play, volume fraction, how many</p> <p>3 burrowing organisms you have working that are at</p> <p>4 the sediment mound, how long the sediment has</p> <p>5 been down for consolidation. All of that affects</p> <p>6 bulk density, affects erodibility, and bulk</p> <p>7 density is very important in here.</p> <p>8 The comparison of the maximum</p> <p>9 amount of stress for potential dredged material</p> <p>10 disposal site simulation in the three observing</p> <p>11 Campaigns and Sandy, throwing in Sandy, came out</p> <p>12 with this set of numbers. Cornfield one. Six</p> <p>13 Mile was next. Fishers Island west, this is</p> <p>14 south of Fishers Island near the deep hole, was</p> <p>15 next. Then Niantic Bay and Clinton Harbor. You</p> <p>16 run down this guy, the New London disposal site</p> <p>17 is point 69. All of these guys here; Block</p> <p>18 Island, New London, Fishers Island Center,</p> <p>19 Orient, Fishers Island East and North of Montauk</p> <p>20 are less than the defined critical threshold,</p> <p>21 point 75.</p> <p>22 What this guy is, is just a graph</p> <p>23 of areas where the maximum amount of stress</p> <p>24 exceeds point 75. To give you an idea that it</p> <p>25 covers a fair number of the sites in the Eastern</p>	<p style="text-align: right;">54</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 Sound, it covers a fair number of sites in the</p> <p>3 Eastern Sound, with the exception of the Fishers</p> <p>4 Island site down here. This is the kind of</p> <p>5 information that is coming in, that we can bring</p> <p>6 into the site selection designation.</p> <p>7 So, sites one, two and seven,</p> <p>8 Cornfield Shoals, Six Mile and Fishers Island.</p> <p>9 Everybody knows where they are, and Fishers</p> <p>10 Island west, have high maximum stress. Four and</p> <p>11 ten, this is Orient Point and Block Island, the</p> <p>12 Block Island Sound site. Maximum stress is below</p> <p>13 at the center of the site, but have values in</p> <p>14 excess of point 75 Pascals at the boundary. So</p> <p>15 there is a spatial variation on the scale of a</p> <p>16 mile or so. Grant already told you that the</p> <p>17 resolution of the model might be on the order of</p> <p>18 a quarter of a mile or so.</p> <p>19 Sites three and five, Niantic Bay</p> <p>20 and Clinton Harbor, maximum stresses, but less</p> <p>21 than one. The stresses are above point 75, but</p> <p>22 less than one. If you want to really hold me to</p> <p>23 point 75, you can make your one, you can argue</p> <p>24 about a quarter of a Dyne or so, a quarter of a</p> <p>25 Pascal or so, the issue gets interesting. The</p>
<p style="text-align: right;">55</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 New London disposal is the only site in the</p> <p>3 Eastern Sound with a maximum stress level below</p> <p>4 point 75. We saw that. Thank you. Questions?</p> <p>5 DR. HAY: Before you have any</p> <p>6 questions, state your name, please, for the</p> <p>7 record, and also your affiliation.</p> <p>8 MR. GASH: I am Bill Gash,</p> <p>9 Connecticut Maritime Coalition. Referencing back</p> <p>10 to one of your earlier slides when you were</p> <p>11 talking about shear out there, I have a letter</p> <p>12 from the State of New York objecting to</p> <p>13 consistency certification for dredge projects</p> <p>14 taking place in Mystic.</p> <p>15 I just want to be clear on</p> <p>16 something. They state in their letter that</p> <p>17 sediments associated with that project were</p> <p>18 comprised almost entirely of fine grained, very</p> <p>19 small silty particles. I would imagine those are</p> <p>20 the same fines that you are talking about.</p> <p>21 DR. BOHLEN: What fines?</p> <p>22 MR. GASH: That all stick</p> <p>23 together, they are all glued together.</p> <p>24 DR. BOHLEN: Yes, yes.</p> <p>25 MR. GASH: They said given the high</p>	<p style="text-align: right;">56</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 current velocities and unstable nature of</p> <p>3 sediments at and in the vicinity of NLDS, and the</p> <p>4 placement of the material from this proposal that</p> <p>5 contains large volumes of that very fine silt,</p> <p>6 adverse effects are anticipated at the site,</p> <p>7 adjacent areas as a result of the dredge material</p> <p>8 disposal activities. Can you comment on that at</p> <p>9 all? From what I am seeing from your</p> <p>10 presentation with the Pascals and the disposals,</p> <p>11 once the material has fallen, there is going to</p> <p>12 be some dispersion as they are falling. But as</p> <p>13 they get near bottom, everything pretty much</p> <p>14 settles down to less than point 75 shear in</p> <p>15 Pascals.</p> <p>16 DR. BOHLEN: I really can't</p> <p>17 comment on it because I don't have the sediment</p> <p>18 data to look at. But seemingly the statement, at</p> <p>19 least the first part of the statement that you</p> <p>20 read, flies in the face of what I said about the</p> <p>21 erodibility of the materials that are</p> <p>22 progressively more cohesive. As you get down</p> <p>23 into the silt range of sediments, below 63</p> <p>24 microns, the sediment, a sediment mass is very,</p> <p>25 very cohesive, and tends to get probably more</p>

<p style="text-align: right;">57</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 cohesive, will get more cohesive as you add more</p> <p>3 clay particles.</p> <p>4 The problem with any one of these</p> <p>5 about diagrams is they show you a single grain</p> <p>6 size. If I picked up that stuff out of my bucket</p> <p>7 and I said we did sediment grabs, full-on grabs</p> <p>8 at each of the stations that we were doing CTD</p> <p>9 casts at, it would be shmuck on the deck. It</p> <p>10 would be quite cohesive and clay like. When you</p> <p>11 get an analysis, you find there is a range of</p> <p>12 particle sizes. So you might say the mean grain</p> <p>13 size is 50 microns. But you have got a lot of</p> <p>14 stuff that is down to two, and you may have a</p> <p>15 little bit of stuff, because we do the grain</p> <p>16 size, distribution by mass, so a few big</p> <p>17 particles can skew the mean a lot.</p> <p>18 Most of the sediments that we are</p> <p>19 familiar with in Mystic River are exceedingly</p> <p>20 cohesive. This is all I can tell you. As far as</p> <p>21 the barge goes, that is another whole story. 45</p> <p>22 years ago had us diving on the New London</p> <p>23 disposal site. The sea story in that is that</p> <p>24 this was material that was being dredged from the</p> <p>25 Thames River for the channel up to the submarine</p>	<p style="text-align: right;">58</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 base, the channel from the mouth of the river up</p> <p>3 to the submarine base. If you look, it is being</p> <p>4 put into dredge by clamshell dredge and put into</p> <p>5 2,000 cubic yard hopper barges. The barge would</p> <p>6 go out and they would open the bottom door and</p> <p>7 down goes the stuff.</p> <p>8 We would go down after a while, I</p> <p>9 am not going into going down, but we would go</p> <p>10 down after a while for a swim. Any number of</p> <p>11 pieces of that stuff on the bottom retained the</p> <p>12 teeth marks from the clamshell bucket. When you</p> <p>13 drop that stuff in the water, there is a gravity</p> <p>14 flow. It goes down like a brick, vertically, and</p> <p>15 it retains its cohesive character until lobsters</p> <p>16 drill holes in it. That is another story.</p> <p>17 DR. HAY: Any other comments, any</p> <p>18 questions?</p> <p>19 MS. PURNELL: Marguerite Purnell.</p> <p>20 DR. HAY: Do you want to state your</p> <p>21 affiliation.</p> <p>22 MS. PURNELL: Fishers Island.</p> <p>23 The information that is presented today, is it on</p> <p>24 the web site yet?</p> <p>25 DR. BOHLEN: No.</p>
<p style="text-align: right;">59</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 MS. PURNELL: Will it be posted</p> <p>3 on the web site as one of our presentations?</p> <p>4 MS. BROCHI: It will, and when we</p> <p>5 post information, we are going to send an E-mail</p> <p>6 notification so everybody knows that it will be</p> <p>7 available.</p> <p>8 MS. PURNELL: Because there is just</p> <p>9 a lot of material. I could ask you 40,000</p> <p>10 questions and it is not really productive for the</p> <p>11 other people who are here.</p> <p>12 DR. BOHLEN: You could try one.</p> <p>13 MS. BROCHI: She already asked</p> <p>14 one.</p> <p>15 DR. BOHLEN: That is okay. She</p> <p>16 can ask one other question.</p> <p>17 MS. PURNELL: I appreciate the</p> <p>18 physical oceanography component to it, and there</p> <p>19 is a lot of meat in there to really think about.</p> <p>20 Have you made any effort to correlate that with</p> <p>21 the prior physical oceanography that was done in</p> <p>22 the prior designation for Western Long Island</p> <p>23 Sound and Central Long Island Sound since there</p> <p>24 were data points in the Eastern Long Island Sound</p> <p>25 for the siting feasibility as well. I was just</p>	<p style="text-align: right;">60</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 wondering whether or not you have looked at the</p> <p>3 consistency of the data and the findings as of</p> <p>4 yet.</p> <p>5 DR. BOHLEN: I am not exactly</p> <p>6 sure what you are asking. Because as I showed</p> <p>7 you, I think, you are going to expect a fair</p> <p>8 amount of difference in the transporter regime in</p> <p>9 the central and western Sound, where we have</p> <p>10 worked before, but not on the siting study. Me,</p> <p>11 not on the siting study.</p> <p>12 I have worked on other parts of the</p> <p>13 Sound, so there is a significant difference in</p> <p>14 the transport system in the Central Sound,</p> <p>15 Western Sound versus the Eastern Sound.</p> <p>16 MS. PURNELL: I concur.</p> <p>17 DR. BOHLEN: You can believe it</p> <p>18 just from an energetic standpoint, you saw all of</p> <p>19 those arrows, the blue arrows, the white arrows</p> <p>20 we showed you on the model. Then of course there</p> <p>21 is the matter of it being open to the world ocean</p> <p>22 out there from the southeast. It is a much more</p> <p>23 energetic system. The comparison between the two</p> <p>24 I am not so sure is germane to this question.</p> <p>25 MS. PURNELL: The comparison is</p>

<p style="text-align: right;">61</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 germane in the sense that there was a large chunk</p> <p>3 of data in the physical oceanography report that</p> <p>4 dealt with the Eastern Long Island Sound. I</p> <p>5 apologize if that did not come across in my</p> <p>6 question.</p> <p>7 DR. BOHLEN: Anything that dealt</p> <p>8 with the Eastern Long Island Sound we have seen.</p> <p>9 Of course, the other thing is we did the report</p> <p>10 that is in the Long Island Sound volume on the</p> <p>11 physical oceanography of Long Island Sound. We</p> <p>12 saw some of the slides from that report up here.</p> <p>13 So we are looking at all of that, and that will</p> <p>14 all be brought together. I think the thing that</p> <p>15 is impressive on this from the standpoint, again,</p> <p>16 from the history of disposal in the Sound is you</p> <p>17 have got more site specific measurements in this</p> <p>18 study than you had in any other study area.</p> <p>19 There were seven frames out there,</p> <p>20 and the effort to tie all that together, and</p> <p>21 verify, calibrate and redesign the model has been</p> <p>22 substantial, leaving you with a very powerful</p> <p>23 tool to be used for any use out there, really.</p> <p>24 It is a substantial foundation to resolve the</p> <p>25 issue.</p>	<p style="text-align: right;">62</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 MS. PURNELL: The data point that</p> <p>3 was closest to the New London dump site, you</p> <p>4 based some of your findings on that. Where is</p> <p>5 that related to the position of the current</p> <p>6 outline of the dump site? Is it in it or is it</p> <p>7 to the northwest or is it to the southwest?</p> <p>8 Given the resolution of the slide, it is hard to</p> <p>9 figure.</p> <p>10 DR. BOHLEN: Why don't we look</p> <p>11 on here as to exactly where it is. I will put</p> <p>12 the slide up and show you.</p> <p>13 DR. MCCARDELL: I should add that</p> <p>14 the seven sites that we used for the surveys were</p> <p>15 chosen to represent the maximum variability that</p> <p>16 we would see within this entire domain as an</p> <p>17 attempt to get the model as good as we could.</p> <p>18 They were not chosen to represent any specific</p> <p>19 site, because we are legislated to be able to</p> <p>20 consider all possible sites. If we give undue</p> <p>21 credence to one site, we would have measurements</p> <p>22 at one site and not others.</p> <p>23 MS. PURNELL: Thank you.</p> <p>24 DR. MCCARDELL: I hope that</p> <p>25 explains a little bit.</p>
<p style="text-align: right;">63</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 MS. PURNELL: Thank you.</p> <p>3 DR. HAY: Thank you. Other</p> <p>4 questions?</p> <p>5 MR. MCALLISTER: Kevin McAllister,</p> <p>6 Defend H2O. That was very thorough. Thank you,</p> <p>7 Doctor. Forgive me if I am missing something,</p> <p>8 but this component with the physical</p> <p>9 oceanography, we are really focusing on</p> <p>10 dispersal, the biological implications as</p> <p>11 defined, I guess, at least in part with the</p> <p>12 environmental consequences. Was that another</p> <p>13 part? Am I missing something?</p> <p>14 DR. BOHLEN: No biology.</p> <p>15 MR. MCALLISTER: No biology. Of</p> <p>16 course, certainly I understand that part, but</p> <p>17 where is the biology?</p> <p>18 MS. BROCHI: This is one part of</p> <p>19 the site screening. This is the physio component.</p> <p>20 There is a biological component as well.</p> <p>21 Biological characterization will be done combined</p> <p>22 with this physio model to model sediment transport</p> <p>23 as well.</p> <p>24 MR. MCALLISTER: Will you be back</p> <p>25 in town to share this information with us?</p>	<p style="text-align: right;">64</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 MS. BROCHI: We will share the</p> <p>3 information, but we don't know the dates. Again,</p> <p>4 whenever anything is posted on the web site, we</p> <p>5 will notify you ahead of time. While this physio</p> <p>6 presentation is fresh in your mind, we will have</p> <p>7 it available probably next week. We will send</p> <p>8 out notification and have the presentation up, so</p> <p>9 yes. It is a multi faceted process, so it has</p> <p>10 many components going on, and we have contractors</p> <p>11 putting it together as we speak.</p> <p>12 MR. MCALLISTER: As I understand,</p> <p>13 if I am not mistaken, was it the environmental</p> <p>14 consequences document that seems to be the bulk</p> <p>15 of the biology? That is at least what I saw so</p> <p>16 far as being represented. Is that correct?</p> <p>17 MS. BROCHI: I am not sure what</p> <p>18 you mean by "environmental consequences."</p> <p>19 DR. HAY: Do you mean the SEIS,</p> <p>20 the Supplemental Environmental Impact Study?</p> <p>21 MR. MCALLISTER: No, there was</p> <p>22 another document that I had viewed, environmental</p> <p>23 consequences document.</p> <p>24 MS. BROCHI: I am not familiar</p> <p>25 with the environmental consequences document, but</p>



<p style="text-align: right;">65</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 if you remember it or you can reference it, send</p> <p>3 an E-mail to any of us, actually, or ELIS@EPA.gov</p> <p>4 e-mail, and we can get back to you.</p> <p>5 DR. HAY: The environmental</p> <p>6 consequences document will be part of the SEIS.</p> <p>7 MR. MCALLISTER: Chapter five,</p> <p>8 environmental consequences.</p> <p>9 MS. BROCHI: All right. I</p> <p>10 thought you were looking at something.</p> <p>11 MR. MCALLISTER: Thank you.</p> <p>12 MS. BROCHI: There is also a no</p> <p>13 action alternative as part of this effort. So it</p> <p>14 is looking at sites, but is also looking at what</p> <p>15 happens if there is no site.</p> <p>16 DR. HAY: Okay then. Other</p> <p>17 questions, comments?</p> <p>18 DR. BOHLEN: We are pretty easy</p> <p>19 to find. BOHLEN@UCONN.EDU, or you can just take</p> <p>20 a look at the University of Connecticut and see</p> <p>21 the faces in here. If there are questions, we</p> <p>22 are happy to answer them.</p> <p>23 MR. MCALLISTER: May I make a</p> <p>24 request with respect to our sign in? Would it be</p> <p>25 possible to provide some contact information to</p>	<p style="text-align: right;">66</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 the attendees here via E-mail?</p> <p>3 MS. BROCHI: Sure.</p> <p>4 MR. MCALLISTER: Because a couple</p> <p>5 of those slides that were identified went by very</p> <p>6 quickly.</p> <p>7 DR. BOHLEN: I'm sorry, a couple</p> <p>8 of the slides --</p> <p>9 MR. MCALLISTER: A couple of the</p> <p>10 slides that identified the presenters and who was</p> <p>11 being represented today, that went very quickly.</p> <p>12 I didn't get names and contact information.</p> <p>13 MS. BROCHI: Sure, we will get</p> <p>14 that out. We will do that in the notification</p> <p>15 when we post the information on the web site.</p> <p>16 MR. MCALLISTER: Thank you.</p> <p>17 DR. HAY: The names of the</p> <p>18 presenters is also on the agenda.</p> <p>19 A SPEAKER: Just an anonymous</p> <p>20 question. Who is responding to the ELIS@EPA.gov</p> <p>21 address?</p> <p>22 MS. BROCHI: Several of us at the</p> <p>23 Region 1 office.</p> <p>24 DR. HAY: Thank you. Other</p> <p>25 questions?</p>
<p style="text-align: right;">67</p> <p>1 SEIS MEETING 12-8-2014</p> <p>2 MS. ESPOSITO: Adrienne Esposito,</p> <p>3 Citizens Campaign for the Environment. Just for</p> <p>4 clarity, the University of Connecticut is</p> <p>5 contracted out by the EPA to do this work?</p> <p>6 DR. BOHLEN: No.</p> <p>7 MS. BROCHI: They are contracted</p> <p>8 for the project, and the contract is through</p> <p>9 Connecticut DOT, not directly to the EPA.</p> <p>10 MS. ESPOSITO: Okay, but</p> <p>11 contracted for this effort.</p> <p>12 MS. BROCHI: Yes.</p> <p>13 MS. ESPOSITO: I understand.</p> <p>14 DR. BOHLEN: You heard about a</p> <p>15 whole bunch of other things, and we may or may</p> <p>16 not involved in those.</p> <p>17 DR. HAY: Other questions? Going</p> <p>18 once, twice? Last chance? I will adjourn the</p> <p>19 meeting now.</p> <p>20 (TIME NOTED: 4:25 P.M.)</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>	<p style="text-align: right;">68</p> <p>1</p> <p>2 CERTIFICATION</p> <p>3</p> <p>4</p> <p>5</p> <p>6 I, Robert J. Pollack, a Notary</p> <p>7 Public in and for the State of New</p> <p>8 York, do hereby certify:</p> <p>9 THAT the foregoing is a true and</p> <p>10 accurate transcript of my stenographic</p> <p>11 notes.</p> <p>12 IN WITNESS WHEREOF, I have</p> <p>13 hereunto set my hand this 13th day of</p> <p>14 December 2014.</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p> <p style="text-align: center;">ROBERT J. POLLACK</p>

<b>A</b>			
<b>able</b> 25:8 27:4,12 29:9 33:17 62:19	<b>amplitudes</b> 39:15	<b>August</b> 20:9	<b>biology</b> 63:14,15,17 64:15
<b>absence</b> 20:23	<b>analyses</b> 6:14	<b>authority</b> 5:5,11	<b>bit</b> 16:24 18:16 20:16 30:12 33:3 39:2,14 43:6 52:7 52:7,10,16 57:15 62:25
<b>accuracy</b> 31:21	<b>analysis</b> 46:17 49:10 50:22 57:11	<b>available</b> 3:19,20 59:7 64:7	<b>blew</b> 16:12,14
<b>accurate</b> 68:10	<b>analytic</b> 27:2	<b>average</b> 23:11 25:24 26:2 37:14,19 39:4,7,12,13	<b>blind</b> 44:4
<b>accurately</b> 33:18	<b>Anker's</b> 6:24	<b>averages</b> 46:6	<b>Block</b> 17:18,18 48:24 53:17 54:11 54:12
<b>acoustic</b> 32:16 33:5	<b>anonymous</b> 66:19	<b>Avery</b> 34:17	<b>blow</b> 44:16 49:20
<b>Acquire</b> 18:19	<b>answer</b> 16:18 41:13 65:22	<b>awful</b> 13:9 51:5	<b>blue</b> 17:13 24:5 35:25 36:8 45:6,8 60:19
<b>Act</b> 4:23,24 5:4 6:4	<b>anticipated</b> 37:10 56:6	<b>axis</b> 39:20	<b>blues</b> 36:7 44:25 47:13
<b>acting</b> 39:20 51:14	<b>Anyway</b> 4:4		<b>Bohlen</b> 1:16 3:13 4:20 8:8,10 17:5 22:12,18 25:4 30:8,10 37:11 41:25 42:6,8,10 45:7 46:9,13,16 49:24 55:21,24 56:16 58:25 59:12 59:15 60:5,17 61:7 62:10 63:14 65:18 66:7 67:6 67:14
<b>action</b> 65:13	<b>apologize</b> 61:5		<b>BOHLEN@UCONN. ...</b> 65:19
<b>active</b> 17:25	<b>applicant</b> 5:22		<b>bone</b> 33:18
<b>activities</b> 12:18 56:8	<b>apply</b> 5:22		<b>border</b> 41:17
<b>actual</b> 26:10	<b>appreciate</b> 59:17		<b>bordering</b> 37:6
<b>ad</b> 40:4	<b>approach</b> 11:17		<b>bottles</b> 34:22
<b>ADCP</b> 32:17 33:8 36:5 37:15	<b>April</b> 7:4 20:9		<b>bottom</b> 18:8 24:14 27:14 28:2,7 30:16,20,22 31:18 32:23 33:11,14 36:7 37:15,23 38:3,10 39:10 40:8,13,15,21 41:6 43:9,17 46:18 48:5,16 56:13 58:6,11
<b>ADCP's</b> 36:21	<b>April/May</b> 19:22		<b>boundary</b> 11:18,21 11:22,24 12:18 13:21,22,23,23,25 14:2,5,11,13,14 18:10,18 29:16 33:12 34:7 42:5 43:10 51:21 54:14
<b>add</b> 57:2 62:13	<b>area</b> 11:11 15:18 22:7 28:16,17,18 35:12 40:25 41:19 47:3,14 48:5 61:18		
<b>addition</b> 2:21	<b>areas</b> 17:24 23:24 25:14 40:10 46:22 50:24,25 51:7 52:9 53:23 56:7		
<b>additional</b> 6:15 7:23	<b>argue</b> 42:10 52:17 54:23		
<b>address</b> 7:18 66:21	<b>Amy</b> 41:18		
<b>adjacent</b> 56:7	<b>array</b> 34:2 45:4		
<b>adjourn</b> 67:18	<b>arrays</b> 30:21 46:7 46:13 47:7		
<b>Adrienne</b> 1:19 67:2	<b>arrows</b> 60:19,19,19		
<b>adverse</b> 56:6	<b>art</b> 30:2		
<b>affect</b> 11:24 21:3,6 42:11 43:17	<b>asked</b> 9:15 59:13		
<b>affiliation</b> 55:7 58:21	<b>asking</b> 11:7 60:6		
<b>afraid</b> 9:5,11	<b>assess</b> 10:6		
<b>afternoon</b> 2:4 4:5 8:8 20:16 44:14 49:16,19	<b>assisting</b> 2:15		
<b>age</b> 44:4	<b>associated</b> 12:17 23:21 55:17		
<b>agency</b> 2:20 6:22	<b>Assuming</b> 8:2		
<b>agenda</b> 66:18	<b>assumption</b> 19:24		
<b>ago</b> 25:2 37:11 57:22	<b>Atlantic</b> 25:18 28:10		
<b>ahead</b> 64:5	<b>atmospheric</b> 15:14 21:5 27:8		
<b>air</b> 21:4	<b>attempt</b> 62:17		
<b>Alicia</b> 4:12	<b>attended</b> 7:5,8		
<b>allow</b> 10:6 35:7	<b>attendees</b> 66:2		
<b>allowed</b> 48:19	<b>attention</b> 16:2 19:9 50:20		
<b>allows</b> 32:23 34:25	<b>audio</b> 3:18		
<b>alternative</b> 65:13			
<b>amount</b> 8:13 16:14 18:14 21:24,25 46:14 47:14 49:17 50:24 53:9,23 60:8			
<b>amplitude</b> 40:18			

<b>boxes</b> 35:23 <b>break</b> 11:20 13:16 43:5,20 <b>breakover</b> 12:23 <b>breaks</b> 13:18 <b>breeze</b> 49:16,20 <b>brick</b> 58:14 <b>bring</b> 34:24 54:5 <b>Brochi</b> 1:15 3:8,22 3:23 4:9 59:4,13 63:18 64:2,17,24 65:9,12 66:3,13 66:22 67:7,12 <b>Bronx</b> 49:13 <b>brought</b> 61:14 <b>bucket</b> 57:6 58:12 <b>build</b> 10:5 <b>built</b> 17:21 <b>bulk</b> 13:17,19 42:22 42:23 43:24 53:6 53:6 64:14 <b>bunch</b> 67:15 <b>buoy</b> 6:15,16 30:18 <b>buoys</b> 28:25 30:18 <b>burrowing</b> 53:3 <b>burst</b> 33:25	<b>Cd</b> 27:19,19 <b>cell</b> 2:10 <b>center</b> 53:18 54:13 <b>centimeter</b> 15:22 <b>centimeters</b> 33:10 36:7 38:18,19,20 38:23 39:4,5,12 <b>central</b> 5:10,17 59:23 60:9,14 <b>Century</b> 26:16,18 27:3 <b>certain</b> 11:10 25:7,7 25:11 36:11 <b>certainly</b> 28:22 63:16 <b>certification</b> 55:13 68:2 <b>certify</b> 68:8 <b>chance</b> 2:6 51:20 67:18 <b>change</b> 11:16 15:6 20:24 36:14 43:13 43:15,16 51:20 <b>changing</b> 34:15 <b>channel</b> 57:25 58:2 <b>Chapter</b> 65:7 <b>character</b> 58:15 <b>characteristic</b> 37:25 38:5,9 43:8 <b>characteristics</b> 10:3 14:19 21:3 24:3 43:15 46:23 <b>characterization</b> 63:21 <b>Characterize</b> 18:9 <b>charge</b> 13:5 <b>chart</b> 32:2 <b>check</b> 36:15 42:18 <b>chemical</b> 8:23 <b>chose</b> 52:14 <b>chosen</b> 62:15,18 <b>Christmas</b> 9:10 <b>chunk</b> 61:2 <b>circled</b> 16:6 <b>circulation</b> 10:19,25 11:4 18:10,12,18 18:24 19:15 20:7 21:5,6,9 <b>circumstances</b> 9:17 <b>Citizens</b> 1:19 67:3 <b>claimed</b> 36:11 <b>clamshell</b> 58:4,12 <b>clarity</b> 67:4	<b>class</b> 12:7 14:15 <b>clay</b> 57:3,10 <b>clays</b> 12:25 13:10 <b>Clean</b> 4:23 <b>clear</b> 17:6 18:20 31:21 39:13 55:15 <b>climatology</b> 25:22 25:23,25 26:5,6 <b>Clinton</b> 6:11 48:23 49:4 53:15 54:20 <b>close</b> 41:19 45:2 48:11 51:11 <b>closer</b> 14:2,3,5 42:3 48:6 50:25 <b>closest</b> 62:3 <b>cloud</b> 18:17 <b>cm/sec</b> 38:24 <b>Coalition</b> 1:22 55:9 <b>coarse</b> 12:14 16:17 <b>coarser</b> 45:20 <b>coast</b> 25:17 <b>Coastal</b> 3:9 <b>coefficient</b> 42:15,17 43:25 <b>coherent</b> 33:5 36:6 <b>cohesion</b> 16:19 <b>cohesive</b> 12:13,20 13:11 14:22 15:5 16:9 52:24 56:22 56:25 57:2,2,10 57:20 58:15 <b>cold</b> 20:23 <b>College</b> 1:5 <b>color</b> 44:4 <b>colors</b> 37:22 <b>column</b> 18:15 21:4,6 21:7 33:24 34:9 43:12 <b>combined</b> 4:7 63:21 <b>come</b> 9:8 22:24 31:20 32:9 38:13 43:6 49:9 61:5 <b>comes</b> 19:18 38:8 51:17 <b>comfortable</b> 38:20 47:6 <b>coming</b> 4:4 14:10,13 20:20 21:19,20 22:20 31:5 41:10 41:11 54:5 <b>comment</b> 3:5 7:10 7:24 56:8,17 <b>comments</b> 3:7,16	58:17 65:17 <b>common</b> 15:19 20:14 <b>Community</b> 1:5 <b>compare</b> 24:7 35:6 46:20 <b>compared</b> 30:7 <b>comparison</b> 45:12 53:8 60:23,25 <b>complex</b> 14:9,14 28:5 <b>complexity</b> 52:11 <b>complicated</b> 51:22 52:25 <b>complications</b> 43:6 <b>component</b> 39:19 59:18 63:8,19,20 <b>components</b> 64:10 <b>comprised</b> 55:18 <b>computed</b> 27:17 <b>computer</b> 26:25 <b>computers</b> 27:5 <b>concentration</b> 33:23 34:11 <b>concur</b> 60:16 <b>conditions</b> 25:24 26:7,10 27:11 31:7,8,9,10,14,19 48:17 52:3 <b>conducted</b> 3:2 <b>conductivity</b> 34:19 34:21 <b>Connecticut</b> 1:16,17 1:22 2:13,14,16 2:23 3:14 8:11 19:19 22:20 24:22 38:8 55:9 65:20 67:4,9 <b>consequences</b> 63:12 64:14,18,23,25 65:6,8 <b>consider</b> 13:20 62:20 <b>considered</b> 46:22 <b>consistency</b> 55:13 60:3 <b>consolidation</b> 53:5 <b>constant</b> 27:20 <b>contact</b> 65:25 66:12 <b>contains</b> 28:10,12 56:5 <b>contract</b> 2:12,14 67:8
---	--	---	--

<b>contracted</b> 67:5,7 67:11 <b>contractors</b> 64:10 <b>convert</b> 15:23 <b>cool</b> 20:18 <b>cooling</b> 20:17 <b>cooperating</b> 6:22 <b>Comfield</b> 5:12 6:10 17:25 48:21 52:5 53:12 54:8 <b>Corp</b> 5:11,22 6:25 41:18 <b>Corps</b> 4:24 5:2,15 <b>correct</b> 64:16 <b>correlate</b> 59:20 <b>correlation</b> 40:20,24 45:25 <b>correlations</b> 45:24 <b>corridor</b> 2:8 <b>Cote</b> 4:10 <b>counter</b> 16:12,14 <b>counterintuitive</b> 16:10,24 <b>counting</b> 44:15 <b>couple</b> 2:4 17:25 33:21 34:3 66:4,7 66:9 <b>course</b> 15:4 19:4 22:19 44:23 60:20 61:9 63:16 <b>covers</b> 28:8 46:11 53:25 54:2 <b>created</b> 50:23 <b>credence</b> 62:21 <b>criteria</b> 6:2 <b>critical</b> 14:19 15:6 16:4,9 17:7 52:22 52:24 53:20 <b>CTD</b> 34:21 35:10 57:8 <b>cubic</b> 58:5 <b>current</b> 25:13 27:11 29:11 32:17,21,22 33:5 56:2 62:5 <b>currents</b> 11:3 30:4 32:20 34:9,10 36:4 <b>curse</b> 31:3 <b>cycle</b> 21:18 22:3 40:16 44:20,24 <b>cycles</b> 37:19 <b>cynicism</b> 30:12	<hr/> <b>D</b> <hr/> <b>d</b> 1:18 42:17 <b>data</b> 18:19 25:20 31:20 34:4 35:20 35:21,25 36:17 37:3,5 40:12 41:22 45:6,9 46:5 46:6 52:13,18 56:18 59:24 60:3 61:3 62:2 <b>date</b> 22:8 25:25 26:2 <b>dates</b> 64:3 <b>day</b> 4:5 44:16 68:13 <b>days</b> 31:24 44:23 <b>deal</b> 12:12 14:15 23:8 <b>dealing</b> 22:15 23:10 <b>dealt</b> 61:4,7 <b>DEC</b> 19:9 <b>December</b> 1:9 8:5 20:10 68:14 <b>decimal</b> 23:8 <b>deck</b> 57:9 <b>deep</b> 19:8 20:12 47:7 49:3 53:14 <b>Defend</b> 1:23 63:6 <b>define</b> 9:3 52:12 <b>defined</b> 41:18 53:20 63:11 <b>degrees</b> 26:3 <b>density</b> 21:3,4,5,8 23:22 27:19 38:2 53:6,7 <b>Department</b> 2:14,16 3:15 8:11 <b>depending</b> 35:19 <b>depends</b> 52:25 <b>Deploy</b> 30:15 <b>deployment</b> 36:14 <b>depth</b> 28:12 34:20 34:21 <b>depths</b> 47:3,5 <b>Describe</b> 18:7 <b>design</b> 52:15 <b>designate</b> 5:5,19 <b>designation</b> 2:18 5:8 5:9 8:3 54:6 59:22 <b>designed</b> 2:24 12:5 <b>detail</b> 6:5,6 22:13 <b>determine</b> 19:12 <b>develop</b> 5:20 <b>developed</b> 9:24	24:23 26:16 <b>devices</b> 3:18 <b>diagram</b> 14:18 <b>diagrams</b> 57:5 <b>dies</b> 32:8 <b>difference</b> 14:21 40:12 41:9 51:6 60:8,13 <b>differences</b> 13:5 31:18 47:18,22 <b>different</b> 27:22 31:9 31:12 37:22 48:20 48:20 52:8 <b>difficult</b> 16:23 <b>directly</b> 67:9 <b>disaggregate</b> 11:20 <b>discharge</b> 32:2,3 <b>discreet</b> 10:4 <b>discrete</b> 10:5 12:9 28:19 30:14 34:8 34:23 <b>discussion</b> 8:7 16:3 <b>dispersal</b> 63:10 <b>dispersion</b> 56:12 <b>display</b> 20:4,5 <b>disposal</b> 2:19 5:5,8 5:11,13,16,19 6:18 8:15,16 17:24 41:4 46:22 53:10,16 55:2 56:8 57:23 61:16 <b>disposals</b> 56:10 <b>dispose</b> 18:16 <b>distance</b> 41:8 <b>distinction</b> 13:12 <b>distinguish</b> 29:14 <b>distribution</b> 10:20 18:8 24:13,24 35:12 43:14 57:16 <b>distributions</b> 43:16 <b>divide</b> 49:2 <b>diving</b> 57:22 <b>dock</b> 31:4 <b>Doctor</b> 63:7 <b>document</b> 64:14,22 64:23,25 65:6 <b>documents</b> 7:17 <b>doing</b> 5:19 35:10 36:22 45:2 57:8 <b>domain</b> 29:8,9 62:16 <b>dominated</b> 19:2 <b>door</b> 58:6 <b>Doppler</b> 32:16 33:5	<b>DOT</b> 67:9 <b>DOTs</b> 47:4 <b>double</b> 27:24 <b>Doug</b> 4:11 <b>dove</b> 45:8 <b>Dr</b> 2:2 8:8 17:5 22:12,18 24:20 25:4 30:8,10 37:8 37:11 41:23,25 42:6,7,8,10 45:5,7 46:9,11,13,14,16 49:24 55:5,21,24 56:16 58:17,20,25 59:12,15 60:5,17 61:7 62:10,13,24 63:3,14 64:19 65:5,16,18 66:7 66:17,24 67:6,14 67:17 <b>draft</b> 7:20,21,25,25 <b>drag</b> 11:19 22:2 42:15,17 43:25 <b>draw</b> 35:5 <b>dredge</b> 5:7 7:2 29:15 55:13 56:7 58:4,4 <b>dredged</b> 2:19 4:25 5:5 6:18 8:14,15 16:25 17:24 53:9 57:24 <b>dredging</b> 5:21 7:2,2 8:15 13:9 <b>drift</b> 37:17,24 39:5,6 39:7 <b>drill</b> 58:16 <b>drive</b> 44:13 <b>driven</b> 23:22 <b>drop</b> 58:13 <b>dropping</b> 48:21 <b>due</b> 19:23 <b>dump</b> 62:3,6 <b>dynamics</b> 26:18 <b>Dyne</b> 54:24 <b>Dynes</b> 15:21
			<hr/> <b>E</b> <hr/> <b>E</b> 1:12,12,18,18,18 1:18 <b>e-mail</b> 7:12 59:5 65:3,4 66:2 <b>earlier</b> 30:25 51:3 55:10 <b>early</b> 19:6 <b>east</b> 1:6 19:13

20:11 22:24 29:16 33:16 51:11 53:19 <b>eastern</b> 4:15 5:14 5:18 6:9 17:17 21:14,21 48:22,25 50:11 52:5 53:25 54:3 55:3 59:24 60:15 61:4,8 <b>easy</b> 65:18 <b>ebb</b> 21:23,24 22:21 <b>educational</b> 6:25 <b>effect</b> 13:21 48:4 <b>effects</b> 11:4 14:14 34:6 56:6 <b>effort</b> 59:20 61:20 65:13 67:11 <b>either</b> 17:23 44:21 <b>electrochemical</b> 13:5 <b>elements</b> 28:11,12 28:13 <b>elevated</b> 32:3 <b>ELIS</b> 7:12 <b>ELIS@EPA.gov</b> 65:3 66:20 <b>ellipses</b> 39:16 <b>emphasize</b> 8:20 <b>enemy</b> 22:14 <b>energetic</b> 60:18,23 <b>energy</b> 32:9 51:24 <b>Engineers</b> 4:24 5:2 5:15,23 <b>entire</b> 46:12,15 62:16 <b>entirely</b> 55:18 <b>entrained</b> 18:15 <b>Environment</b> 1:20 67:3 <b>environmental</b> 1:2 2:17 3:3 4:15 5:25 7:21 17:20 63:12 64:13,18,20,22,25 65:5,8 <b>EPA</b> 1:15 2:17,20 3:10 4:7,7,8,24 5:4,21 6:24 7:17 41:18 67:5,9 <b>EPA's</b> 3:21 <b>EPA.gov</b> 7:12 <b>equals</b> 27:18 <b>equation</b> 26:13,14 27:10 33:15 <b>equations</b> 26:19,20	26:23,24 27:5,7 <b>equipment</b> 7:3 <b>erodibility</b> 53:6 56:21 <b>erosion</b> 14:20 <b>esoteric</b> 42:12 <b>Esposito</b> 1:19 22:10 22:16 49:22 67:2 67:2,10,13 <b>estuarine</b> 37:25 <b>estuary</b> 38:4 <b>evaluate</b> 7:20 10:13 31:21 <b>evaluating</b> 30:7 <b>event</b> 49:18 <b>events</b> 25:13 <b>everybody</b> 9:7 18:22 24:20 54:9 59:6 <b>evolution</b> 8:17,19 <b>exactly</b> 60:5 62:11 <b>example</b> 24:25 <b>examples</b> 37:13 <b>exceedingly</b> 57:19 <b>exceeds</b> 53:24 <b>excellent</b> 45:3,25 <b>exception</b> 32:14 54:3 <b>excess</b> 19:20 37:5 54:14 <b>excursion</b> 44:18 <b>exert</b> 11:18 <b>exerting</b> 11:9 <b>expanded</b> 26:17 <b>expect</b> 31:17 32:2 37:8 39:21 41:2 46:24 51:7 60:7 <b>expected</b> 18:9 <b>expire</b> 5:15 <b>explains</b> 10:18 62:25 <b>extended</b> 27:12 <b>extent</b> 19:8 25:11 40:7 <b>extreme</b> 25:13	<b>failure</b> 13:19 <b>fair</b> 8:13 16:14 17:17 19:7 21:24 21:24 31:7 47:13 49:17 53:25 54:2 60:7 <b>fairly</b> 12:13 19:25 21:17 47:15 48:21 51:22 <b>fall</b> 31:11 <b>fallen</b> 56:11 <b>falling</b> 56:12 <b>familiar</b> 12:8 15:11 57:19 64:24 <b>famous</b> 14:18 <b>far</b> 7:3 29:24 34:5 41:21 57:20 64:16 <b>fashion</b> 28:3 <b>fast</b> 20:21 <b>feasibility</b> 9:3,14 10:3 17:13,19 41:16 46:19 47:15 59:25 <b>federal</b> 2:20 5:23 <b>feel</b> 7:11,14 50:4 <b>feeling</b> 19:21 30:24 37:13 38:24 45:10 <b>feet</b> 29:16 34:12,13 39:2 42:5,5 <b>field</b> 13:22,24 14:9 15:3 21:8 23:23 34:5 37:2 43:9,17 <b>fifth</b> 11:14 <b>figure</b> 10:24 47:25 62:9 <b>figured</b> 36:12 <b>film</b> 22:4 <b>filter</b> 35:5 <b>final</b> 5:9 8:4 <b>find</b> 9:9 15:22 16:22 30:19 46:18 47:22 48:7 51:24 57:11 65:19 <b>findings</b> 2:25 60:3 62:4 <b>fine</b> 13:2,10 16:7,18 29:13,15 33:12 42:24 55:18 56:5 <b>finer</b> 10:7 12:21 15:4 16:8,8 29:6,7 29:10 <b>fines</b> 55:20,21 <b>fimware</b> 37:2	<b>first</b> 4:12 9:15 15:9 17:12 26:15 35:23 36:10 40:5 41:15 56:19 <b>Fishers</b> 1:21 48:11 48:11 49:2,3,3 53:13,14,18,19 54:3,8,9 58:22 <b>fit</b> 45:16,16 <b>five</b> 27:21 29:12 54:19 65:7 <b>flies</b> 56:20 <b>floats</b> 30:18 <b>flood</b> 21:22,22 22:21 <b>floor</b> 34:10 36:5 37:17 38:16 <b>flour</b> 16:13,20,20 <b>flow</b> 11:15 13:24 14:3,15 21:15 26:21 29:9 32:6 32:10 34:4 37:14 37:23,25 39:13 43:15,17 52:11 58:14 <b>flows</b> 11:5 21:21 25:19 29:10 40:2 51:15 <b>fluid</b> 26:18,21 <b>fluids</b> 27:6 <b>focus</b> 4:19 <b>focusing</b> 5:18 6:9 63:9 <b>fold</b> 27:25 <b>follow</b> 6:5 <b>followed</b> 3:12 <b>foot</b> 39:6 <b>force</b> 11:10,10,11 11:18,23 15:18 16:17 <b>forced</b> 25:18,19,22 <b>forces</b> 11:15 <b>forecast</b> 10:11 27:9 <b>foregoing</b> 68:9 <b>Forgive</b> 63:7 <b>forgotten</b> 46:9 <b>form</b> 11:24 <b>formula</b> 27:17 42:15 42:22,23 43:25 <b>formulation</b> 42:14 <b>forth</b> 34:15 39:8,8,9 39:11,11,11 <b>forward</b> 8:4
--	---	---	--

<b>foundation</b> 61:24 <b>four</b> 9:25 18:4 22:25 27:25 34:2 54:10 <b>fraction</b> 53:2,2 <b>frame</b> 33:19 34:12 <b>frames</b> 30:16 32:13 34:15 61:19 <b>Frank</b> 1:16 3:13 4:20 8:7,9 22:16 <b>free</b> 7:12,14 <b>fresh</b> 19:16,17,20 20:25 64:6 <b>fresher</b> 38:5,7,7 <b>friction</b> 14:3 28:2 43:15 <b>Fridtjof</b> 10:22 <b>friend</b> 11:14 <b>front</b> 14:12 <b>full</b> 35:25,25 44:12 44:17 <b>full-on</b> 57:7 <b>fundamental</b> 24:18 <b>further</b> 7:20 26:17 40:2	39:8 40:3 47:19 48:19,24 49:6 51:17 58:6,8,9 <b>goes</b> 16:9 17:8,15 23:6 35:19 36:20 57:21 58:7,14 <b>going</b> 6:13 8:6,20,25 9:16,18,23 10:12 10:13 11:8,8,9,16 11:21 12:5 14:4 15:24 18:15 19:7 20:18,19,21,22,25 21:19 22:15 24:22 30:6,8,13,14 31:12,14,15 32:18 32:19 38:9,13 39:8,9 40:10 42:11,14 43:22 44:15,16 47:22 56:11 58:9,9 59:5 60:7 64:10 67:17 <b>good</b> 2:3 8:8 10:14 16:22 35:22 37:13 41:21 43:2 45:10 50:14 51:12,13,14 52:20 62:17 <b>Google</b> 15:20 21:10 <b>govern</b> 43:13 <b>grab</b> 35:11 <b>grabs</b> 57:7,7 <b>grade</b> 11:14 <b>gradient</b> 14:4 <b>grain</b> 12:21 13:13 13:17,17 52:25 57:5,12,15 <b>grained</b> 12:14 13:10 16:17,18 55:18 <b>grains</b> 13:2 <b>Grant</b> 1:17 3:13 24:18,21 33:14 42:13 54:16 <b>granted</b> 9:7 <b>granular</b> 12:9 14:23 <b>graph</b> 53:22 <b>graphic</b> 39:23 <b>graphics</b> 22:6 <b>gravity</b> 12:10,16 58:13 <b>gray</b> 41:17 <b>greater</b> 36:2 <b>green</b> 6:16 <b>grid</b> 28:6 <b>Grimaldi</b> 4:12	<b>Group</b> 2:12 <b>groups</b> 47:4 <b>guess</b> 63:11 <b>Guilford</b> 17:15 <b>guy</b> 16:6 17:14 19:10 21:11 23:6 32:15 33:8 35:23 36:6,8,10 41:6 47:16 51:2 53:16 53:22 <b>guys</b> 23:2 32:7 53:17	38:2 50:23 51:24 52:7,15 <b>historic</b> 6:17 18:3,3 25:20 <b>historical</b> 52:13 <b>history</b> 61:16 <b>hold</b> 7:22 54:22 <b>hole</b> 49:3 53:14 <b>holes</b> 58:16 <b>Holy</b> 9:10 <b>hope</b> 2:6 10:7 19:3 25:9 62:24 <b>hopper</b> 58:5 <b>horizontal</b> 15:17 42:23 <b>hour</b> 23:13 34:2 38:22,23,25 49:15 49:23,25 <b>hours</b> 22:2 <b>housekeeping</b> 2:5 <b>hundred</b> 29:12 <b>hundreds</b> 50:19 <b>husky</b> 49:19
<b>G</b>			
<b>game</b> 15:24 33:4 <b>Gash</b> 1:22 17:3 55:8 55:8,22,25 <b>gather</b> 31:19 <b>general</b> 6:3 12:7 37:23 <b>generally</b> 32:9 37:24 39:20 42:17 <b>geochemical</b> 8:23 <b>germane</b> 60:24 61:2 <b>getting</b> 15:5,10 24:8 38:7 44:4 48:12 <b>give</b> 3:11 10:15 38:24 39:3 48:8 53:24 62:20 <b>given</b> 25:24 55:25 62:8 <b>gives</b> 23:16 <b>glass</b> 19:12 <b>glued</b> 13:16 55:23 <b>gluey</b> 14:22 <b>go</b> 6:5 9:18 11:2,8,9 11:9,13 13:17 14:25 15:3 21:22 23:15,19 24:17 25:5,19 28:25 30:13 36:3,12,25			
<b>H</b>			
<b>H2O</b> 1:23 63:6 <b>half</b> 23:4,12 38:15 39:24 44:17 48:10 50:12 <b>hand</b> 4:2 42:16 68:13 <b>handmaidens</b> 9:21 <b>hands</b> 16:22 <b>happen</b> 44:16 <b>happening</b> 29:5 <b>happens</b> 65:15 <b>happy</b> 46:2 65:22 <b>Harbor</b> 29:22 50:18 53:15 54:20 <b>hard</b> 17:22 21:11 44:3 62:8 <b>Hay</b> 1:14 2:2,11 42:7 55:5 58:17 58:20 63:3 64:19 65:5,16 66:17,24 67:17 <b>hear</b> 3:25 8:9 11:21 12:6 15:13 32:18 32:19 <b>heard</b> 15:12 67:14 <b>heat</b> 20:22 <b>height</b> 30:4 <b>heights</b> 24:9 29:20 29:21 <b>held</b> 2:23 7:3 <b>Hello</b> 24:20 <b>help</b> 30:19 <b>hereunto</b> 68:13 <b>herring</b> 11:2 <b>high</b> 16:5 27:4 32:10 34:13 44:14 45:25 47:15 48:21 54:10 55:25 <b>higher</b> 22:22 29:3			
<b>I</b>			
<b>idea</b> 20:12 21:19 23:16 35:11 38:17 39:4,22,25 47:5 53:24 <b>identified</b> 46:21 66:5 66:10 <b>imagine</b> 55:19 <b>Impact</b> 1:3 2:18 3:3 4:15 5:25 7:21 17:20 64:20 <b>implications</b> 63:10 <b>importance</b> 11:6 <b>important</b> 10:9 21:12 22:14 28:19 53:7 <b>impractical</b> 29:7 <b>impress</b> 22:6 <b>impressive</b> 50:5,6 52:21 61:15 <b>inch</b> 15:11,13,17,23 <b>include</b> 6:10 <b>increase</b> 27:25 <b>increased</b> 44:19 <b>increases</b> 51:20 <b>indicate</b> 10:16 <b>indication</b> 10:16 <b>individual</b> 13:13 <b>inflow</b> 19:21 20:25			

<b>inflows</b> 19:16,17 <b>influence</b> 20:3,5 40:20 41:20 <b>influenced</b> 40:10 41:2 <b>influences</b> 41:5 <b>influencing</b> 40:8 43:8 <b>information</b> 8:18 49:5 54:5 58:23 59:5 63:25 64:3 65:25 66:12,15 <b>informational</b> 3:4 <b>initial</b> 18:13 26:7 <b>initially</b> 5:24 6:8 <b>initiated</b> 6:14,14 <b>initiation</b> 15:8,9 <b>instantaneous</b> 37:18 <b>instruments</b> 30:15 30:16 35:2 36:23 <b>intensively</b> 19:6 <b>Intent</b> 6:21 <b>interaction</b> 51:18 52:11 <b>interacts</b> 23:21 <b>interested</b> 27:15 <b>interesting</b> 16:3 17:9 35:21 47:17 51:19 54:25 <b>interface</b> 12:17 <b>interval</b> 50:19 <b>introduce</b> 8:6 <b>introduction</b> 18:13 <b>involved</b> 67:16 <b>Isaac</b> 26:17 <b>Island</b> 1:21 4:16 5:7 6:9 8:22 9:8,10 18:23,24 19:5 20:20 22:25 29:21 38:7 48:11,12,22 48:24,25 49:12,13 50:9,17 53:13,14 53:18,18,19 54:4 54:8,10,11,12 58:22 59:22,23,24 61:4,8,10,11 <b>issue</b> 54:25 61:25 <b>items</b> 2:5	<b>job</b> 45:3 <b>Judith</b> 17:18 29:5 <b>July</b> 5:9 <b>June</b> 4:18,18 6:7 44:21	<b>lighter</b> 36:8 38:5 <b>limited</b> 29:3 <b>line</b> 42:25 43:3 45:17 <b>linear</b> 28:2,3 <b>listed</b> 7:18 <b>listen</b> 6:13 <b>listened</b> 52:23 <b>literature</b> 52:13 <b>little</b> 11:25 12:9 13:6 20:16 21:11 21:23 22:4 23:24 28:24 29:2 30:12 30:18 32:15 33:3 39:2,14 42:12 43:6 45:20 48:4 52:6,7,10,16 57:15 62:25 <b>live</b> 30:11 32:4 <b>lived</b> 49:11 <b>lobster</b> 30:19 <b>lobsters</b> 58:15 <b>locations</b> 6:15,16 25:8,14 31:17 48:20 <b>log</b> 42:20,21,23,25 43:24 <b>London</b> 2:23 5:13 6:11 18:2 48:23 52:5 53:16,18 55:2 57:22 62:3 <b>long</b> 4:15 5:7 6:9 8:22 17:16 18:24 19:5 20:20 22:25 23:12 26:9 29:21 37:17 38:6 40:11 40:22 43:22 48:22 48:24,25 49:12,13 50:9,17 53:4 59:22,23,24 61:4 61:8,10,11 <b>look</b> 10:11 11:3 12:4 13:21 21:11 22:4 22:7 24:23 35:16 35:17 37:4,20 42:20 47:5 48:9 50:2,4 56:18 58:3 62:10 65:20 <b>looked</b> 27:9 60:2 <b>looking</b> 5:25 12:21 13:11 15:7 22:9 24:4 33:8 34:5 35:3 36:6 37:16	38:11 40:7,14,17 41:12,21 45:11 51:25 52:19 61:13 65:10,14,14 <b>looks</b> 28:6 43:2 <b>lot</b> 11:21 12:6 13:9 21:15 30:13 32:18 34:3 36:3 37:7 49:15 51:5,15 57:13,17 59:9,19 <b>Louis</b> 1:14 2:12 <b>low</b> 21:17 <b>lower</b> 21:13 22:23 32:6,9,9 36:18 52:10,16 <b>lowering</b> 34:23 <b>lull</b> 19:25 <b>lunar</b> 39:18
<b>J</b> 1:14 68:6,18 <b>Jean</b> 1:15 3:8 <b>Jeanie</b> 4:9	<b>K</b> 1:12,18 <b>keep</b> 23:11 39:9 <b>Kevin</b> 1:23 63:5 <b>kicked</b> 6:20 <b>kind</b> 36:22 49:5 54:4 <b>kinds</b> 46:3 <b>Kings</b> 50:9,10 <b>kitchen</b> 16:11 <b>knot</b> 38:22 39:25 49:20 <b>know</b> 9:25 16:21 29:4 31:2,4 32:7 35:4 42:6 51:14 64:3 <b>knows</b> 9:7,10 18:22 54:9 59:6	<b>live</b> 30:11 32:4 <b>lived</b> 49:11 <b>lobster</b> 30:19 <b>lobsters</b> 58:15 <b>locations</b> 6:15,16 25:8,14 31:17 48:20 <b>log</b> 42:20,21,23,25 43:24 <b>London</b> 2:23 5:13 6:11 18:2 48:23 52:5 53:16,18 55:2 57:22 62:3 <b>long</b> 4:15 5:7 6:9 8:22 17:16 18:24 19:5 20:20 22:25 23:12 26:9 29:21 37:17 38:6 40:11 40:22 43:22 48:22 48:24,25 49:12,13 50:9,17 53:4 59:22,23,24 61:4 61:8,10,11 <b>look</b> 10:11 11:3 12:4 13:21 21:11 22:4 22:7 24:23 35:16 35:17 37:4,20 42:20 47:5 48:9 50:2,4 56:18 58:3 62:10 65:20 <b>looked</b> 27:9 60:2 <b>looking</b> 5:25 12:21 13:11 15:7 22:9 24:4 33:8 34:5 35:3 36:6 37:16	<b>M</b> 39:18 <b>M2</b> 39:18 <b>M3</b> 19:12 <b>magnets</b> 13:6 <b>magnifying</b> 19:11 <b>magnitude</b> 18:8 27:15 38:17,17 39:22 40:14 46:18 <b>Main</b> 1:6 <b>making</b> 7:20,25 8:4 <b>management</b> 4:25 5:20 <b>manager</b> 1:15 3:9 4:10 <b>manner</b> 52:23 <b>manufacturer</b> 32:16 36:11,24 <b>March</b> 31:23 <b>marching</b> 24:10 39:9 39:11 <b>margin</b> 41:17 <b>Marguerite</b> 1:21 58:19 <b>Marine</b> 3:14 4:22 5:3 6:3 8:11 <b>Maritime</b> 1:22 55:9 <b>marked</b> 23:5 <b>marks</b> 58:12 <b>mass</b> 56:24 57:16 <b>material</b> 2:19 4:25 5:6 6:18 7:3 8:15 8:16 12:9 13:9 16:8,25 17:24 18:14,16 53:9

56:4,7,11 57:24 59:9 <b>materials</b> 5:8 12:12 12:21 15:5 41:4 52:25 56:21 <b>matrix</b> 12:17 13:4 13:15 <b>matter</b> 60:21 <b>Mattituck</b> 17:16 <b>max</b> 40:2 45:20 <b>maximum</b> 18:8 24:15 45:21 46:14 46:18 48:16 50:23 53:8,23 54:10,12 54:20 55:3 62:15 <b>McAllister</b> 1:23 63:5 63:5,15,24 64:12 64:21 65:7,11,23 66:4,9,16 <b>McCardell</b> 1:17 3:13 24:19,20,21 37:8 41:23 45:5 46:11 46:14 62:13,24 <b>mean</b> 26:4,14 35:15 37:14 45:19 57:12 57:17 64:18,19 <b>meaning</b> 33:6 <b>means</b> 10:25 11:2 15:21 28:2,4 45:19,23 <b>measure</b> 9:25 10:3 11:10 30:14 33:17 33:23 <b>measured</b> 45:4,12 45:14 <b>measurement</b> 36:23 37:18 <b>measurements</b> 25:5 25:7 30:20 32:23 32:25 33:7,14 34:18 43:23 61:17 62:21 <b>measures</b> 33:10 <b>measuring</b> 10:8 32:20 33:9 34:9 45:24 <b>meat</b> 59:19 <b>meeting</b> 2:1,3,22,24 3:1,3,10,17,19,22 4:1,6,7,19 5:1,17 6:1 7:1,11 8:1 9:1 10:1 11:1 12:1 13:1 14:1 15:1	16:1 17:1 18:1 19:1 20:1 21:1 22:1 23:1 24:1 25:1 26:1 27:1 28:1 29:1 30:1 31:1 32:1 33:1 34:1 35:1 36:1 37:1 38:1 39:1 40:1 41:1 42:1 43:1 44:1 45:1 46:1 47:1 48:1 49:1 50:1 51:1 52:1 53:1 54:1 55:1 56:1 57:1 58:1 59:1 60:1 61:1 62:1 63:1 64:1 65:1 66:1 67:1,19 <b>meetings</b> 4:16 6:22 6:23 7:14,16,23 <b>Mel</b> 4:10 <b>melt</b> 19:23,24 <b>memorable</b> 50:6,7 <b>men's</b> 2:9 <b>mentioned</b> 6:23 42:16 <b>mesh</b> 28:19,20 29:7 <b>met</b> 4:12 <b>meter</b> 32:21,22 33:9 33:11 38:15 39:24 <b>meters</b> 29:12 37:16 38:14 42:7,8 50:11,13 <b>micron</b> 12:23 <b>microns</b> 12:23,25 56:24 57:13 <b>microphone</b> 3:24,25 <b>mid</b> 19:25 <b>middle</b> 36:8 <b>migrate</b> 38:4,6 <b>mile</b> 6:12 29:13 38:22,23,25 48:23 49:23,24 52:6,6 53:13 54:8,16,18 <b>miles</b> 49:15 <b>millibars</b> 15:12 <b>millimeters</b> 12:22 <b>million</b> 50:21 <b>mind</b> 18:10 46:25 64:6 <b>minute</b> 30:17 <b>minutes</b> 7:15 <b>missed</b> 41:15	<b>missing</b> 63:7,13 <b>mistaken</b> 64:13 <b>model</b> 9:24 10:6,9 10:12,12,13,14,15 18:20 21:9 24:6,7 24:18,23,25 25:9 25:10,11,15,16,17 25:20 26:7,9,12 26:12,13,21 27:11 27:14 28:8,10,14 28:18,21 29:18,24 30:7,11 31:21 40:5,5 42:14 44:6 45:2,5,13,15 46:2 47:20 51:4 52:19 52:20 54:17 60:20 61:21 62:17 63:22 63:22 <b>modeled</b> 45:13,14 <b>modeling</b> 45:23 <b>models</b> 25:3 26:25 27:7,8 28:3,4 <b>moments</b> 25:2 <b>monitored</b> 19:8 <b>monitoring</b> 5:20 <b>Montauk</b> 17:18 23:25 47:8 48:14 48:15 53:19 <b>month</b> 47:21 <b>monthly</b> 20:4 22:3 40:16 44:11,12 <b>moon</b> 44:12,17,19 <b>moral</b> 51:23 <b>morning</b> 10:11 27:9 44:13 <b>motion</b> 15:9,9 27:6 <b>mound</b> 53:4 <b>mounted</b> 30:16,21 30:23 <b>mouth</b> 58:2 <b>move</b> 8:4 16:13,15 16:23 21:20 41:5 <b>movement</b> 11:5 <b>movie</b> 25:2 <b>moving</b> 18:11 29:16 40:17 <b>mucilaginous</b> 12:17 13:4 <b>multi</b> 64:9 <b>Mystic</b> 55:14 57:19 <hr/> <b>N</b> <hr/> <b>N</b> 1:18	<b>name</b> 2:11 55:6 <b>names</b> 66:12,17 <b>Nansen</b> 10:22,22 <b>nature</b> 22:14 56:2 <b>nauseam</b> 40:4 <b>nautical</b> 38:22,23 <b>Navier-Stokes</b> 26:19 <b>neap</b> 44:7,8,8,9,24 <b>near</b> 34:10 35:25 36:5 37:15,23 43:9 44:12,14 49:3 53:14 56:13 <b>nearly</b> 49:21 <b>neat</b> 40:19 <b>Neck</b> 20:11 <b>need</b> 3:24 9:25 14:24 29:8 <b>nest</b> 29:6 <b>nested</b> 25:16,16 28:7 <b>net</b> 37:17 <b>never</b> 31:2 <b>nevertheless</b> 29:2 <b>new</b> 1:7 2:23 5:13 6:10 17:25 18:4 25:25 29:21 44:19 48:23 50:8,18 52:4 53:16,18 55:2,12 57:22 62:3 68:7 <b>Newton</b> 26:17 <b>Newton's</b> 26:15 <b>Niantic</b> 6:11 53:15 54:19 <b>nice</b> 32:8 <b>NLDS</b> 56:3 <b>non</b> 28:2,3 <b>noncohesive</b> 12:6,7 14:23 <b>normally</b> 23:5 27:20 <b>Nortek</b> 32:15 33:3 33:10,19 36:5 38:15 <b>north</b> 19:23 23:24 33:16 53:19 <b>northeast</b> 25:17 <b>northeasterly</b> 51:10 <b>northwest</b> 25:18 28:9 62:7 <b>Norwegian</b> 10:24 <b>Notary</b> 68:6 <b>NOTED</b> 67:20 <b>notes</b> 68:11
--	--	---	---



<b>Notice</b> 6:21 <b>notification</b> 7:13 59:6 64:8 66:14 <b>notify</b> 64:5 <b>number</b> 10:4 17:23 18:2 19:7 30:15 31:17 32:11 34:19 47:11 53:25 54:2 58:10 <b>numbers</b> 52:7 53:12 <b>numerical</b> 10:13 27:5	<b>optical</b> 33:22 35:2 <b>order</b> 25:11 31:24 38:18 39:25 42:18 50:11,12,15 54:17 <b>organisms</b> 53:3 <b>Orient</b> 6:11 24:2 48:23 53:19 54:11 <b>outflow</b> 51:19 <b>outline</b> 62:6 <b>output</b> 25:2 28:21 <b>outside</b> 2:6 40:25 48:25 <b>overall</b> 37:3	<b>permit</b> 5:23 <b>permits</b> 5:22 <b>personnel</b> 5:2 <b>PH.D</b> 1:14 <b>phones</b> 2:10 <b>physical</b> 2:25 3:12 4:19 6:12 8:10,21 8:21,24 9:2,13 10:23 17:11 18:19 59:18,21 61:3,11 63:8 <b>physics</b> 8:22 9:19 <b>physo</b> 8:7 63:19,22 64:5 <b>pick</b> 31:13 48:19 <b>picked</b> 38:14 57:6 <b>picking</b> 48:6 <b>picture</b> 13:12 21:9 51:21 <b>piece</b> 17:17 <b>pieces</b> 58:11 <b>pier</b> 29:6 <b>pile</b> 16:11,13 <b>place</b> 55:14 <b>placement</b> 56:4 <b>plan</b> 5:20 <b>play</b> 17:10 49:4,6 53:2 <b>played</b> 16:20 <b>playing</b> 15:25 47:11 <b>please</b> 2:9 3:25 7:9 7:14 17:6 55:6 <b>plot</b> 42:13,18,20 49:8 <b>point</b> 2:7 3:20 6:11 10:2 11:12 16:5 18:13 24:2 27:20 29:5 34:17 41:14 43:8 45:21,22 46:19 47:12 48:12 48:23 50:9,10 52:14 53:17,21,24 54:11,14,21,23 55:4 56:14 62:2 <b>pointing</b> 19:18 <b>points</b> 10:4,5 23:8 30:15 34:8,8,19 59:24 <b>political</b> 8:24 <b>Pollack</b> 68:6,18 <b>Port</b> 17:18 <b>position</b> 62:5 <b>possibility</b> 13:3	<b>possible</b> 41:5 62:20 65:25 <b>post</b> 59:5 66:15 <b>posted</b> 7:17 59:2 64:4 <b>pot</b> 30:19 <b>potential</b> 2:18 17:24 29:14 46:22 53:9 <b>pounds</b> 15:11,13,17 15:23 <b>powerful</b> 61:22 <b>practically</b> 10:10 <b>predictions</b> 25:12 <b>prepare</b> 2:17 <b>present</b> 2:25 <b>presentation</b> 3:5,7 3:13 6:6 56:10 64:6,8 <b>presentations</b> 59:3 <b>presented</b> 10:15 58:23 <b>presenters</b> 66:10,18 <b>pressure</b> 15:13,14 15:15 43:16 <b>pretty</b> 16:22 20:14 20:18,20 21:21 24:17 28:4 32:5 32:13 35:21,24 39:5 41:21 43:2 43:19 44:14 45:10 47:7 50:14 52:20 56:13 65:18 <b>primary</b> 4:18 48:2 <b>primer</b> 11:25 <b>primitive</b> 26:13,14 27:10 <b>principal</b> 39:18 <b>principles</b> 26:15 <b>prior</b> 46:6 59:21,22 <b>probably</b> 3:24 15:11 18:23 19:2 35:17 37:6 40:23 41:12 47:25 56:25 64:7 <b>probes</b> 33:21 <b>problem</b> 57:4 <b>problems</b> 36:22 <b>process</b> 6:20 7:2,19 46:21 64:9 <b>produces</b> 51:19 <b>productive</b> 59:10 <b>profile</b> 20:13 <b>profiler</b> 32:17 33:6 34:20
<b>O</b>			
<b>objecting</b> 55:12 <b>objective</b> 17:11 <b>OBS</b> 33:22 35:2,6 <b>observation</b> 30:23 <b>observations</b> 37:14 <b>observed</b> 24:7 25:19 44:7 45:12,14,15 48:17 <b>observing</b> 53:10 <b>occupied</b> 19:4 <b>occurs</b> 11:17 <b>ocean</b> 3:9 10:19 27:7 60:21 <b>oceanographer</b> 8:10 <b>Oceanographers</b> 23:8 <b>oceanographic</b> 4:20 <b>oceanography</b> 2:25 3:12 6:12 8:21,22 8:24 9:2,13 10:23 17:12 18:19 30:2 59:18,21 61:3,11 63:9 <b>October</b> 6:21 22:11 22:12 23:14 <b>office</b> 4:13 6:24 66:23 <b>official</b> 7:24 <b>officially</b> 5:9 <b>okay</b> 47:8 59:15 65:16 67:10 <b>once</b> 33:9 36:13,13 38:19 50:19 56:11 67:18 <b>ones</b> 17:25 18:3,3,5 <b>open</b> 2:20 3:10,22 58:6 60:21 <b>operating</b> 21:8 <b>opposed</b> 38:4	<b>P</b>		
<b>P</b> 1:12,18 <b>p.m</b> 1:8 67:20 <b>Pabst</b> 4:11 <b>panel</b> 18:6 47:11 <b>panels</b> 14:17 <b>part</b> 3:2 5:14 12:13 16:2 40:25 51:9 56:19 63:11,13,16 63:18 65:6,13 <b>particle</b> 14:19 57:12 <b>particles</b> 13:6 55:19 57:3,17 <b>particular</b> 11:6 38:12 <b>parts</b> 22:25 23:3,5 60:12 <b>Pascal</b> 15:25 16:7 17:8 43:4,5 44:2 52:14 54:25 <b>Pascals</b> 15:10,20 47:10 48:10 54:14 56:10,15 <b>passes</b> 44:5 <b>Pat</b> 4:11 <b>patterns</b> 10:19 <b>peak</b> 19:22 <b>Pechko</b> 4:11 <b>people</b> 32:20 50:21 59:11 <b>percent</b> 19:20 23:3 23:4,7 30:3 36:2 37:6,6,9,9,12 <b>perfect</b> 45:16 <b>period</b> 3:6 22:13 26:9,11 31:23,25 36:14 40:18 46:23 <b>periods</b> 7:24 31:13 31:22			

<b>profiles</b> 20:10 40:13 <b>profiling</b> 34:20 <b>progress</b> 52:18,18 <b>progressively</b> 15:4 22:23 56:22 <b>project</b> 1:15 2:21 3:8 3:11 40:5 55:17 67:8 <b>projects</b> 55:13 <b>properties</b> 10:20 <b>proposal</b> 56:4 <b>Protection</b> 3:9 4:22 5:4 6:4 <b>provide</b> 10:17 65:25 <b>public</b> 2:3,7,21 3:21 4:16 6:22,23 7:23 68:7 <b>pulse</b> 33:5 36:6 <b>Purnell</b> 1:21 42:4,9 46:5 58:19,19,22 59:2,8,17 60:16 60:25 62:2,23 63:2 <b>purples</b> 44:25 <b>purpose</b> 18:7 <b>purposes</b> 27:16 <b>put</b> 2:10 9:16,17,18 15:18 19:11 28:25 32:21 36:10 37:2 58:4,4 62:11 <b>putting</b> 64:11	<b>Race</b> 19:12,13 21:15 <b>raise</b> 4:2 <b>ran</b> 19:6 51:2 <b>range</b> 31:7,19 44:18 48:10 56:23 57:11 <b>rate</b> 36:17 39:13 <b>rates</b> 37:5 <b>RDI</b> 33:7 37:15 <b>read</b> 17:22 19:10,11 22:11 56:20 <b>readings</b> 30:3 <b>ready</b> 2:2 36:25 <b>reality</b> 25:10 <b>realize</b> 28:20 <b>really</b> 10:6,23 12:2,4 13:2,15 14:23 28:4 29:25 33:11 33:13,17 35:4,15 37:12 43:18 54:22 56:16 59:10,19 61:23 63:9 <b>reason</b> 25:3 <b>reasons</b> 16:25 <b>recognize</b> 19:14 <b>recognizing</b> 18:14 <b>recommended</b> 6:24 <b>recommends</b> 8:2 <b>record</b> 55:7 <b>recorded</b> 3:17 <b>records</b> 29:22,23 <b>recovery</b> 35:20,21 36:2,17 37:5 <b>recurrence</b> 50:15,18 <b>red</b> 24:5 28:15,16 28:17 31:16 45:6 51:23 <b>redesign</b> 61:21 <b>reds</b> 47:10 51:7 <b>reduced</b> 44:18 <b>Reef</b> 6:12 48:23 <b>reference</b> 65:2 <b>Referencing</b> 55:9 <b>referring</b> 25:23 <b>refurbished</b> 36:25 <b>refurbishment</b> 36:24 <b>regime</b> 60:8 <b>Region</b> 1:15 4:7,8,11 4:13 7:17 66:23 <b>regions</b> 24:15 <b>regular</b> 19:16 <b>related</b> 62:5 <b>relationship</b> 41:7	<b>relationships</b> 43:13 <b>relatively</b> 21:25 48:4 <b>remaining</b> 9:21 <b>remember</b> 33:13 65:2 <b>repeat</b> 4:2 <b>replicating</b> 25:10 <b>report</b> 61:3,9,12 <b>represent</b> 26:21 27:5 62:15,18 <b>representatives</b> 4:9 7:6 <b>represented</b> 64:16 66:11 <b>represents</b> 19:19 <b>reproduce</b> 44:6 <b>reproducing</b> 45:3 <b>request</b> 65:24 <b>Research</b> 4:23 <b>reservoir</b> 20:22 <b>residual</b> 51:15 <b>resolution</b> 28:20,21 29:3,4,11,14 54:17 62:8 <b>resolve</b> 61:24 <b>respect</b> 65:24 <b>responded</b> 23:13 <b>responding</b> 66:20 <b>responses</b> 17:9 <b>responsibility</b> 4:25 <b>rest</b> 2:7 28:8 <b>result</b> 6:13 56:7 <b>results</b> 10:16 15:2 49:10 51:3 52:20 <b>resuspension</b> 34:7 <b>retained</b> 58:11 <b>retains</b> 58:15 <b>review</b> 52:14 <b>reviewing</b> 5:21 <b>revolutionary</b> 33:4 <b>Rho</b> 27:18,18 <b>rich</b> 26:22,24 <b>rid</b> 16:22 <b>right</b> 2:8 11:3 13:24 17:14,16 18:23,25 21:16 22:7 24:6 28:7,15 29:5,9,10 33:18 42:3 43:21 44:10,13 45:17 46:16 65:9 <b>river</b> 19:13,19 20:5 20:11 22:20 32:2 32:3,6,9 38:8	57:19,25 58:2 <b>Riverhead</b> 1:7 20:19 25:25 <b>road</b> 44:15 <b>Robert</b> 68:6,18 <b>role</b> 5:18,21 <b>room</b> 2:9,9 14:12 <b>rooms</b> 2:7 <b>roughly</b> 39:17 <b>Route</b> 44:13 <b>rule</b> 7:20,25 8:4 <b>run</b> 21:18 24:7 25:3 25:20 26:7,8 27:10 34:16 47:18 47:21 53:16 <b>running</b> 23:11 28:13 50:23 51:4 52:3
<hr/> <b>S</b> <hr/>			
<b>S</b> 1:12,12,18,18 <b>sailing</b> 49:16,20 <b>sailors</b> 32:7 <b>salinities</b> 22:22,23 23:5 <b>salinity</b> 10:21 20:24 21:2 22:8,19,24 23:18 25:3 29:23 30:5 33:20 34:12 34:18 35:8,24 36:3 <b>salt</b> 23:7 <b>saltier</b> 38:3 <b>sample</b> 33:25,25 <b>samples</b> 34:3,24,25 35:5,7,9 <b>Sanctuaries</b> 4:23 5:4 6:4 <b>sand</b> 12:8,14,19,21 12:24 13:14 16:7 16:11 17:17 <b>sands</b> 15:4 <b>Sandy</b> 23:14,14,15 46:24 49:9,10,11 50:5,7,21,22 51:5 51:9 52:2 53:11 53:11 <b>Sarah</b> 6:24 <b>Sarsaparilla</b> 11:14 <b>saw</b> 24:25 31:25 40:4,5 52:8 55:4 60:18 61:12 64:15 <b>saying</b> 42:2 47:16 <b>says</b> 16:16 32:15			
<hr/> <b>Q</b> <hr/>			
<b>quarter</b> 29:13 54:18 54:24,24 <b>quarters</b> 16:6 17:8 33:11 <b>queen</b> 9:20,22 <b>question</b> 9:12 59:16 60:24 61:6 66:20 <b>questions</b> 3:6,16 7:11 9:15 12:10 17:4,5 24:18 40:9 55:4,6 58:18 59:10 63:4 65:17 65:21 66:25 67:17 <b>quick</b> 20:20 <b>quickly</b> 66:6,11 <b>quite</b> 20:21 29:25 31:2 57:10			
<hr/> <b>R</b> <hr/>			
<b>R</b> 1:12,18 45:21			

33:22 35:25	6:1 7:1 8:1,2,4 9:1	<b>shared</b> 5:21	<b>Sir</b> 26:16
<b>scale</b> 10:7 13:8 22:2	10:1 11:1 12:1	<b>shear</b> 11:21,23 15:6	<b>Sister</b> 11:14
29:8,10,15 50:3	13:1 14:1 15:1	16:4 18:10,18	<b>sit</b> 13:18 49:4 52:16
54:15	16:1 17:1 18:1	31:18 34:7 40:8	<b>site</b> 3:21,21 5:8,20
<b>Scatter</b> 33:23	19:1 20:1 21:1	48:5 51:21 52:22	5:25 6:2 7:17
<b>school</b> 10:24	22:1 23:1 24:1	52:24 55:11 56:14	31:15 41:3,11
<b>science</b> 3:14 10:18	25:1 26:1 27:1	<b>sheet</b> 2:5	53:10,16 54:4,6
<b>sciences</b> 8:12 9:20	28:1 29:1 30:1	<b>shelf</b> 28:9	54:12,13 55:2
9:21	31:1 32:1 33:1	<b>sheltering</b> 24:11	56:6 57:23 58:24
<b>screening</b> 6:2,2	34:1 35:1 36:1	<b>Shields</b> 14:18	59:3 61:17 62:3,6
46:21 63:19	37:1 38:1 39:1	<b>ship</b> 28:23 34:16	62:19,21,22 63:19
<b>screens</b> 14:12	40:1 41:1 42:1	<b>ship's</b> 35:15	64:4 65:15 66:15
<b>scrub</b> 16:21	43:1 44:1 45:1	<b>shmuck</b> 57:9	<b>sites</b> 2:19 5:5,11,12
<b>sea</b> 29:20,20 30:4	46:1 47:1 48:1	<b>Shoal</b> 17:17	5:13,16,18,19 6:8
34:10 36:5 37:16	49:1 50:1 51:1	<b>Shoals</b> 5:13 54:8	6:10,17,19 7:20
38:16 57:23	52:1 53:1 54:1	<b>shore</b> 22:23 41:19	8:3,15,16 29:15
<b>seasonal</b> 20:6 31:10	55:1 56:1 57:1	42:3 50:25	41:10 46:20,22
31:11 47:23	58:1 59:1 60:1	<b>short</b> 21:25 40:11	47:4 49:7 53:25
<b>seasonality</b> 19:17	61:1 62:1 63:1	40:22 43:23	54:2,7,19 62:14
19:22 20:13	64:1,19 65:1,6	<b>show</b> 6:16,18 14:8	62:20 65:14
<b>seasons</b> 48:20	66:1 67:1	20:8,25 57:5	<b>siting</b> 9:2,14 10:2
<b>second</b> 22:5 38:19	<b>select</b> 5:12	62:12	17:13,19 41:16
38:20,21,23 39:4	<b>selected</b> 5:14 10:4	<b>showed</b> 33:15 51:3	46:19 47:14 59:25
39:5,6,12,24	17:7	60:6,20	60:10,11
<b>Section</b> 5:3	<b>selection</b> 54:6	<b>showing</b> 13:13	<b>sits</b> 32:15 33:7
<b>sediment</b> 8:12,13	<b>send</b> 7:12 59:5 64:7	14:18 23:24 28:16	<b>sitting</b> 13:14 16:12
12:7 34:11 35:9	65:2	35:14 39:14 40:12	16:13 18:4 20:22
35:11,12 43:12	<b>sense</b> 9:19 18:24	41:6,9 44:5	23:25 33:20 42:20
53:4,4 56:17,24	20:15 41:3 42:19	<b>shown</b> 38:18	50:25
56:24 57:7 63:22	47:24 48:8 51:8	<b>shows</b> 6:16 15:3	<b>six</b> 6:10,11 18:3
<b>sediments</b> 11:5 12:6	61:2	17:23 20:9 35:23	22:2 48:22 52:6,6
36:4 55:17 56:3	<b>sensitive</b> 40:9	35:24	53:12 54:8
56:23 57:18	<b>sensor</b> 33:20 35:2	<b>side</b> 2:8 17:23 18:6	<b>size</b> 53:2 57:6,13,16
<b>see</b> 5:17 12:3 14:11	<b>sensors</b> 37:7	49:3	<b>sizes</b> 57:12
14:24 15:20 16:25	<b>sent</b> 36:23,25	<b>sign</b> 2:7 7:9,15	<b>skeptic</b> 30:10
18:5 20:2 21:11	<b>series</b> 34:22	65:24	<b>skepticism</b> 30:12,13
21:17 22:8,20,22	<b>set</b> 4:16 12:5 19:3	<b>sign-up</b> 2:5	<b>skew</b> 57:17
23:6 27:17 28:18	20:8 26:19,24	<b>signed</b> 4:13	<b>skills</b> 30:3
30:17 31:3,16,18	41:3 42:4,5 53:12	<b>significance</b> 24:4	<b>slicing</b> 33:12
31:24 32:3,11	68:13	<b>significant</b> 14:21	<b>slide</b> 17:22 19:18
36:7 37:20,21,23	<b>sets</b> 26:22 27:7	15:6 24:9 60:13	23:15 35:21 41:16
39:19 40:15,19	<b>setting</b> 52:24	<b>silt</b> 12:24 56:5,23	51:2 62:8,12
43:19,21 44:3,24	<b>settles</b> 56:14	<b>silts</b> 13:10	<b>slide's</b> 46:6
44:25 45:7,15	<b>seven</b> 30:22 31:16	<b>silty</b> 55:19	<b>slides</b> 20:9 55:10
48:18 51:5,7 52:4	46:7,13 54:7	<b>similar</b> 49:4	61:12 66:5,8,10
52:9 62:16 65:20	61:19 62:14	<b>simply</b> 12:15	<b>slight</b> 45:18
<b>seeing</b> 21:16 30:25	<b>shallow</b> 47:8	<b>simulate</b> 27:6 46:23	<b>slow</b> 14:4 39:5
39:17 40:4 44:22	<b>shallower</b> 41:24	<b>simulation</b> 53:10	<b>small</b> 33:6 55:19
48:3 56:9	42:2,3	<b>simulations</b> 10:14	<b>smallest</b> 24:16
<b>seemingly</b> 56:18	<b>shallows</b> 24:12 51:8	44:6	<b>snot</b> 12:16
<b>seen</b> 8:17 31:15	<b>shape</b> 11:24	<b>single</b> 25:6,6 28:24	<b>snow</b> 19:23,24
61:8	<b>share</b> 4:24 63:25	28:25 32:21,22	<b>solutions</b> 27:3
<b>SEIS</b> 2:1 3:1 4:1 5:1	64:2	42:25 43:3 57:5	<b>Somebody</b> 10:24

<p><b>somewhat</b> 27:21 31:9 36:18 44:18 <b>sorry</b> 66:7 <b>sort</b> 9:8 13:15 15:16 16:10 17:15 23:11 24:17 30:19 37:3 38:16,25 42:16 47:24 48:10 49:19 50:3,16 52:19 <b>sorts</b> 26:22 43:7 <b>sound</b> 4:16 5:7,14 6:9 8:22 17:17 18:24 19:5,15,21 20:7,17 21:14,14 21:21 22:25 24:10 29:21 37:24 38:7 48:11,12,22,24,25 49:13,13 50:9,17 51:16 52:5 54:2,3 54:12 55:3 59:23 59:23,24 60:9,13 60:14,15,15 61:4 61:8,10,11,16 <b>source</b> 28:5 <b>south</b> 33:17 49:2 53:14 <b>southeast</b> 51:11 60:22 <b>southeasterly</b> 51:10 <b>southwest</b> 62:7 <b>space</b> 25:6,24 <b>spatial</b> 10:7 21:12 21:24 23:17 24:9 24:14 31:18 47:18 47:22 51:6 54:15 <b>spatially</b> 27:22 <b>speak</b> 8:9 9:5,6,23 64:11 <b>SPEAKER</b> 66:19 <b>speakers</b> 3:23 <b>specific</b> 6:3 61:17 62:18 <b>speed</b> 27:4 <b>spring</b> 7:22 31:11,22 31:25 32:5 44:7,8 44:9,20,24 <b>spring/neap</b> 40:16 44:20 <b>square</b> 15:11,13,17 15:21,23 27:23 33:15 <b>squared</b> 45:21 <b>standard</b> 32:14</p>	<p><b>standpoint</b> 60:18 61:15 <b>stands</b> 34:12 <b>start</b> 2:3,4 4:20 6:25 24:10 26:8 43:8 51:25 <b>started</b> 10:21,23 19:5 <b>starts</b> 48:21 <b>state</b> 30:2 55:6,12 55:16 58:20 68:7 <b>stated</b> 25:4 <b>statement</b> 1:3 2:18 3:3 4:15 5:25 7:22 17:20 56:18,19 <b>Staten</b> 9:8,10 18:23 <b>station</b> 35:9,18,19 <b>stations</b> 19:4,7 25:21 31:16 34:17 40:24 47:4 57:8 <b>statistics</b> 40:6 <b>stay</b> 9:16,17,18 <b>stenographer</b> 3:18 <b>stenographic</b> 68:10 <b>step</b> 7:19 <b>stick</b> 12:19 13:6 55:22 <b>sticking</b> 17:2 <b>sticky</b> 14:22 <b>stir</b> 39:7 43:11 <b>stirred</b> 24:17 <b>stop</b> 22:5 <b>storm</b> 31:4 46:24 48:16 49:18 51:10 51:24 <b>story</b> 40:11,22 51:23 57:21,23 58:16 <b>Street</b> 1:6 <b>stress</b> 11:12,13,22 11:23 13:16 14:5 15:7,8 16:4,9 18:7 18:8,10,18 24:14 24:15 27:14,25 30:8 31:18 34:7 34:10 40:9,13,15 40:16,21 44:7 45:3 46:12,15,18 47:9,15 48:5,16 51:21 52:12,22,24 53:9,23 54:10,12 55:3 <b>stressed</b> 11:12</p>	<p><b>stresses</b> 24:24 47:10 48:9 50:24 51:14 52:10 54:20 54:21 <b>strong</b> 21:21 <b>stronger</b> 21:23 <b>structure</b> 34:4 <b>structures</b> 21:2 <b>stuck</b> 12:15 16:19 <b>studied</b> 11:25 <b>studies</b> 27:22 <b>study</b> 3:2 4:20 6:12 6:14 11:7 17:12 17:20 19:5 22:7 26:9 27:16 28:16 28:17 32:18 35:12 47:3 60:10,11 61:18,18 64:20 <b>stuff</b> 9:16 11:8,8 12:15 14:22,23 16:17,18 18:11 24:16 30:11 32:14 33:24 39:7 41:5 51:15 57:6,14,15 58:7,11,13 <b>sub</b> 16:4 42:17 <b>subject</b> 41:20 <b>submarine</b> 57:25 58:3 <b>substantial</b> 8:19 61:22,24 <b>sufficient</b> 18:19 <b>Suffolk</b> 1:5 <b>summarizes</b> 49:7 <b>summarizing</b> 15:2 <b>summary</b> 10:17 <b>summer</b> 19:25 31:8 32:6 <b>summers</b> 20:21 <b>Superstorm</b> 50:22 52:2 <b>supplemental</b> 1:2 2:17 4:14 7:21 64:20 <b>support</b> 43:24 <b>suppose</b> 51:24 <b>supposed</b> 49:22 <b>sure</b> 60:6,24 64:17 66:3,13 <b>surface</b> 11:16,17 22:8,17,19,19 23:20 25:3 32:24 38:5,10 39:10</p>	<p><b>surge</b> 50:6,7,10,14 <b>surprise</b> 19:3 49:10 <b>surprising</b> 24:11 <b>surprisingly</b> 40:23 <b>survey</b> 28:22,23 <b>surveys</b> 62:14 <b>suspended</b> 34:11 36:4 <b>suspension</b> 35:3 <b>sweeping</b> 22:21 <b>swim</b> 58:10 <b>system</b> 7:13,14 22:15 23:10,13 39:21 47:6 60:14 60:23</p> <hr/> <p style="text-align: center;"><b>T</b></p> <hr/> <p><b>table</b> 15:2 <b>take</b> 12:4,10 14:20 21:11 22:4 23:12 27:20 28:23 32:23 32:24 34:18,23 65:19 <b>taken</b> 9:7 <b>takes</b> 16:17 <b>talk</b> 6:25 9:9 29:16 30:6,8,17 32:20 <b>talking</b> 8:21,25 14:6 24:5,22 42:13 46:3 55:11,20 <b>Tau</b> 16:4 27:18 <b>technical</b> 12:16 <b>teeth</b> 58:12 <b>tell</b> 18:25 23:13 27:12 57:20 <b>telling</b> 11:15 35:4 36:21 <b>temperature</b> 10:20 20:8,10,13,24 23:18 26:3 30:5 33:20 34:11,18,20 34:21 35:8,24 36:3 <b>Temperature-salinity</b> 21:2 <b>temperatures</b> 29:23 <b>temporal</b> 20:6 21:25 23:18 <b>temporary</b> 5:12 <b>ten</b> 54:11 <b>tend</b> 9:6 38:6 <b>tends</b> 13:10,16,18 15:14 38:3 41:4</p>
---	---	--	---

56:25 <b>tens</b> 23:2,3 <b>term</b> 12:16 37:17 <b>terms</b> 10:25 11:2,11 12:5 15:10,14 26:5 30:2 34:6 <b>terribly</b> 24:11 52:8 <b>testing</b> 52:19 <b>texts</b> 12:3 <b>Thames</b> 57:25 <b>thank</b> 4:4 7:5,6,7 42:9 55:4 62:23 63:2,3,6 65:11 66:16,24 <b>thing</b> 9:8 13:20 14:20 15:16,25 17:12 33:19 36:20 37:3 38:16 39:23 41:12 47:17 50:5 50:6,16 61:9,14 <b>things</b> 26:22 36:16 39:20 40:7 41:14 43:7,22 44:5 50:3 50:12 67:15 <b>think</b> 2:2 59:19 60:7 61:14 <b>thorough</b> 63:6 <b>thought</b> 26:20 42:2 44:3 65:10 <b>thousand</b> 23:2,3,6 34:3 <b>three</b> 16:6 17:8 30:23 31:13 32:10 32:12 33:11 35:22 35:22 37:21 46:20 47:10 48:18 53:10 54:19 <b>threshold</b> 52:15 53:20 <b>Throgs</b> 20:11 <b>throwing</b> 53:11 <b>tidal</b> 20:2 21:9,18 23:22 37:19 39:15 39:16 44:6,18 51:18 <b>tidally</b> 18:25 <b>tide</b> 39:19 44:12 <b>tides</b> 21:7 25:18 <b>tie</b> 61:20 <b>time</b> 3:6,15 7:23 9:4 20:16 21:25,25 25:6 30:25 31:15 32:2 36:10 40:14	40:17 50:2 64:5 67:20 <b>times</b> 25:7 27:19,23 34:2 41:10 <b>tip</b> 49:12 <b>today</b> 5:3 6:14 10:9 15:24 32:14 58:23 66:11 <b>today's</b> 2:24 26:2 <b>told</b> 52:23 54:16 <b>tomorrow</b> 2:22 27:13 35:17 49:23 49:25 <b>tool</b> 33:2 61:23 <b>top</b> 13:14 22:7 33:7 <b>total</b> 28:13 <b>town</b> 63:25 <b>track</b> 35:15,16 <b>transcript</b> 3:19 68:10 <b>transition</b> 31:11,11 <b>transport</b> 8:13 60:14 63:22 <b>Transportation</b> 2:15 2:16 <b>transporter</b> 60:8 <b>transports</b> 18:12 <b>triangles</b> 28:24 29:2 29:6,8 <b>triangular</b> 28:11,19 34:13 <b>tried</b> 10:24 31:13 <b>tripods</b> 30:23 <b>true</b> 68:9 <b>truth</b> 35:4 <b>try</b> 9:3 30:24 31:15 59:12 <b>trying</b> 14:8 <b>tune</b> 25:9 <b>turbulence</b> 26:21 48:2 51:20 <b>turn</b> 2:9 51:22 <b>turning</b> 21:23 <b>twelve</b> 22:2 <b>twice</b> 44:11 67:18 <b>two</b> 14:12 23:24 27:21 32:11 35:22 36:15,20,23 40:20 41:9,10 48:18 54:7 57:14 60:23 <b>two-month</b> 30:23 <b>typical</b> 19:25 22:24 <b>typically</b> 12:20	19:22 <hr/> <b>U</b> <b>U</b> 1:18 <b>unable</b> 25:4 <b>understand</b> 9:4,12 17:13 44:9 63:16 64:12 67:13 <b>undue</b> 62:20 <b>unit</b> 3:9 11:11 15:18 <b>units</b> 15:19,20 23:2 <b>University</b> 1:16,17 2:13 3:14 8:11 24:21 65:20 67:4 <b>unstable</b> 56:2 <b>upcoming</b> 7:14 <b>update</b> 3:11 <b>upper</b> 33:8 <b>use</b> 10:5 25:8,11 26:6,13 27:4 29:7 29:20 31:20 43:24 61:23 <b>useful</b> 33:2 <b>USGS</b> 25:20 <b>usually</b> 15:13 <hr/> <b>V</b> <b>value</b> 16:5 17:7 45:22 <b>values</b> 15:7 46:4,20 47:9 49:4 54:13 <b>variability</b> 24:9 51:6 62:15 <b>variation</b> 16:4 20:4 21:24 22:22,24 30:25 44:9,23 45:18 54:15 <b>variations</b> 20:6,7 21:13 23:17,19 24:14 44:7,11,12 47:23 <b>varies</b> 27:21 <b>variety</b> 14:6 15:19 31:14 <b>vary</b> 27:22 <b>varying</b> 40:18 <b>velocities</b> 21:13,17 33:16 40:3 45:19 56:2 <b>velocity</b> 11:16 13:22 13:24 14:4,9,10 14:13,20 21:15 23:21,22 27:23,24	33:16,17 41:7 43:9,9,14 <b>verified</b> 43:18 <b>verify</b> 18:20 31:20 61:21 <b>versus</b> 21:14 45:24 60:15 <b>vertical</b> 14:10 15:15 18:12,17 32:24,25 33:10 34:5,6,24 39:18 41:8 42:23 43:10,14 48:3 <b>vertically</b> 58:14 <b>vibrate</b> 2:10 <b>vicinity</b> 43:4 47:7 56:3 <b>viewed</b> 64:22 <b>volume</b> 28:13 53:2 61:10 <b>volumes</b> 56:5 <hr/> <b>W</b> <b>wait</b> 17:4 20:18 <b>wake</b> 10:10 <b>walked</b> 23:15 <b>walking</b> 31:4 <b>wander</b> 24:3 <b>want</b> 7:5,10 8:20 16:2 17:4 19:9 21:10 29:3,4 31:2 33:13 41:3 49:2 54:22 55:15 58:20 <b>warm</b> 20:19,21 32:8 <b>water</b> 4:23 11:4 18:15 19:16,17,20 20:8,17,25 21:3,6 21:7 27:19,23,24 30:4 32:5 33:24 34:9,23 35:5,7 38:3,8 43:12 44:14 47:2,5 51:15,19 52:6 58:13 <b>waters</b> 2:20 38:5,6 <b>wave</b> 24:2,9 40:6,18 40:21,25 41:20 51:18 <b>waves</b> 11:4 23:20 23:20 34:10 40:8 40:11 41:2 47:25 48:4 51:13 <b>way</b> 9:4 34:17 38:13 51:11,12
---	---	--	---

